

USERS GUIDE FOR THE STOCKTON SHIP
CHANNEL PROJECT LINK-NODE
HYDRODYNAMIC AND WATER QUALITY MODELS

prepared by

Donald J. Smith
Lisa C. Roig

Resource Management Associates
3738 Mt. Diablo Blvd., Suite 200
Lafayette, CA 94549

RMA 8529
Mar 1986

TABLE OF CONTENTS

	PAGE
I. INTRODUCTION	1
I.1 BACKGROUND	1
I.2 PURPOSE AND SCOPE	1
II. HYDRODYNAMIC AND WATER QUALITY MODEL DESCRIPTION	2
II.1 MODEL REPRESENTATION	2
II.2 HYDRODYNAMIC MODEL	4
II.3 WATER QUALITY MODEL	7
III. MODEL STRUCTURE	18
III.1 HYDRODYNAMIC MODEL	18
III.2 WATER QUALITY MODEL	20
IV. DATA PREPARATION	23
IV.1 HYDRODYNAMIC MODEL DATA REQUIREMENTS	23
IV.2 WATER QUALITY MODEL DATA REQUIREMENTS	41
V. MODEL RESULTS	61
V.1 HYDRODYNAMIC MODEL OUTPUT	61
V.2 WATER QUALITY MODEL OUTPUT	64
VI. EXAMPLE APPLICATION	68
VI.1 HYDRODYNAMIC MODEL	68
VI.2 WATER QUALITY MODELS	70
REFERENCES	125

LIST OF FIGURES AND TABLES

	PAGE
FIGURE II-1 Model Representation of a Typical Cross-Section	3
FIGURE II-2 Interactions and Coupling Between the Stockton Ship Channel Water Quality Model Parameters	11
FIGURE III-1 Estuary Hydrodynamic and Water Quality Model Subroutine Structure	19
FIGURE VI-1 Link-Node Model Representation of the Delta	72
FIGURE VI-2 Link-Node Hydrodynamic Model Example Application Data	73
FIGURE VI-3 Link-Node Hydrodynamic Model Example Application Printout	80
FIGURE VI-4 Link-Node Hydrodynamic Model Example High Resolution Plots	99
FIGURE VI-5 Link-Node Water Quality Model Example Application Data	103
FIGURE VI-6 Link-Node Water Quality Model Example Application Printout	109
FIGURE VI-7 Link-Node Water Quality Model Example High Resolution Plots	123
TABLE IV-1 Chemical, Physical and Biological Coefficients	50

I. INTRODUCTION

I.1 BACKGROUND

The link node hydrodynamic model was originally developed by Water Resources Engineers and the California Department of Water Resources (1) in the late 1960's and applied to the San Francisco Bay Delta system. Since that time, the model has been refined and applied to numerous bays and estuaries throughout the United States.

On June 24, 1983, the Sacramento District of the U.S. Army Corps of Engineers contracted with Resource Management Associates (RMA) to apply the model to the Bay Delta System with emphasis on the Stockton Ship Channel in the vicinity of Stockton. The intent of this modeling study was to determine what effects the deepening of the Ship Channel would have on the hydrodynamics and water quality within the ship channel and adjacent Delta channels. On November 6, 1985, RMA was again retained to expand the models capabilities. These model enhancements included high resolution plot capabilities and a better representation of Clifton Court.

I.2 PURPOSE AND SCOPE

This manual is intended to provide the user with information which is fundamental in the set up and use of the estuary link-node hydrodynamic and dynamic water quality model. It includes a general description of the basic computer program, capabilities added specifically for the Stockton Ship Channel project, and general instructions regarding:

- Geometric representations of the prototype system;
- Hydrodynamic concepts in the model;
- Water quality relationships included in the model;
- Model structure and subroutine function;
- Data requirements and input format specifications;
- General modeling procedure; and
- Interpretation of simulation results.

II. HYDRODYNAMIC AND WATER QUALITY MODEL DESCRIPTION

II.1 MODEL REPRESENTATION

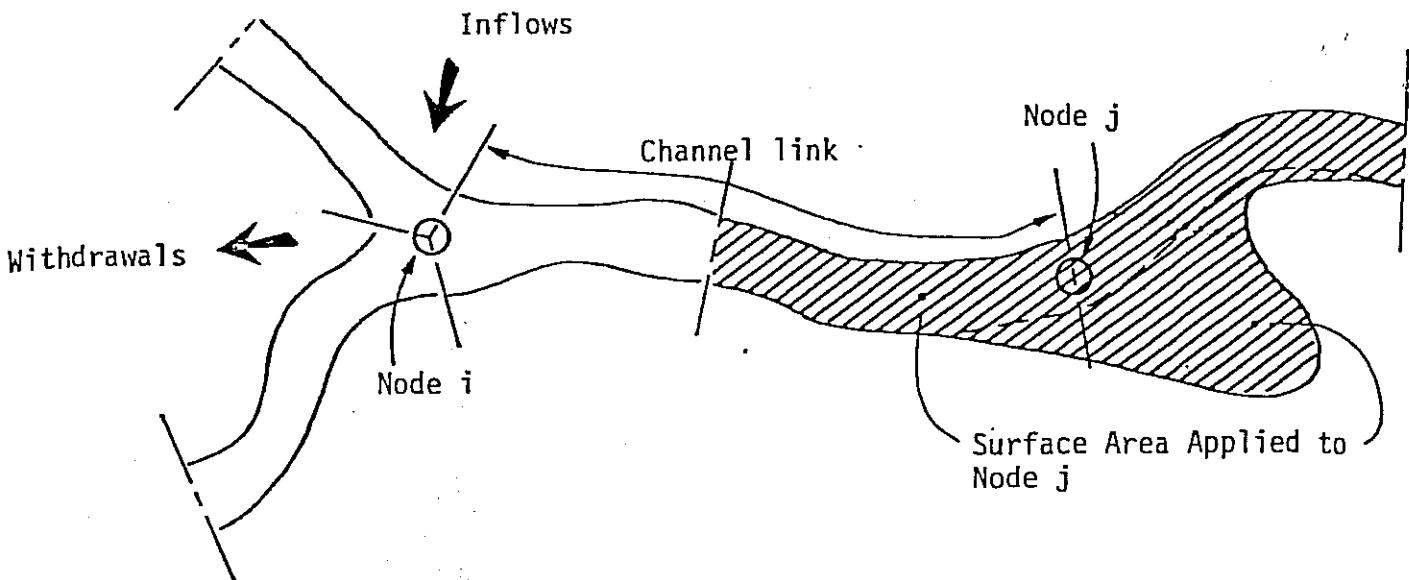
RMA's link node hydrodynamic model represents the estuarine system as a variable grid network of "nodes" and "channels" (i.e., links). Nodes are discrete volume units of waterbody, characterized by surface area, depth, side slope and volume. The nodes are interconnected by channels, each having associated length, width, cross-sectional area, hydraulic radius, side slope and friction factor. Water is constrained to flow from one node to another through these defined channels. A schematic representation of typical links and nodes and the model representation of a typical channel cross section is shown in Figure II-1.

The node generally represents the wetted area bounded by the midpoints of the channels entering the node. Included in this area are backwater areas which may or may not be included in the channel conveyance area. The nodal parameters should be selected such that:

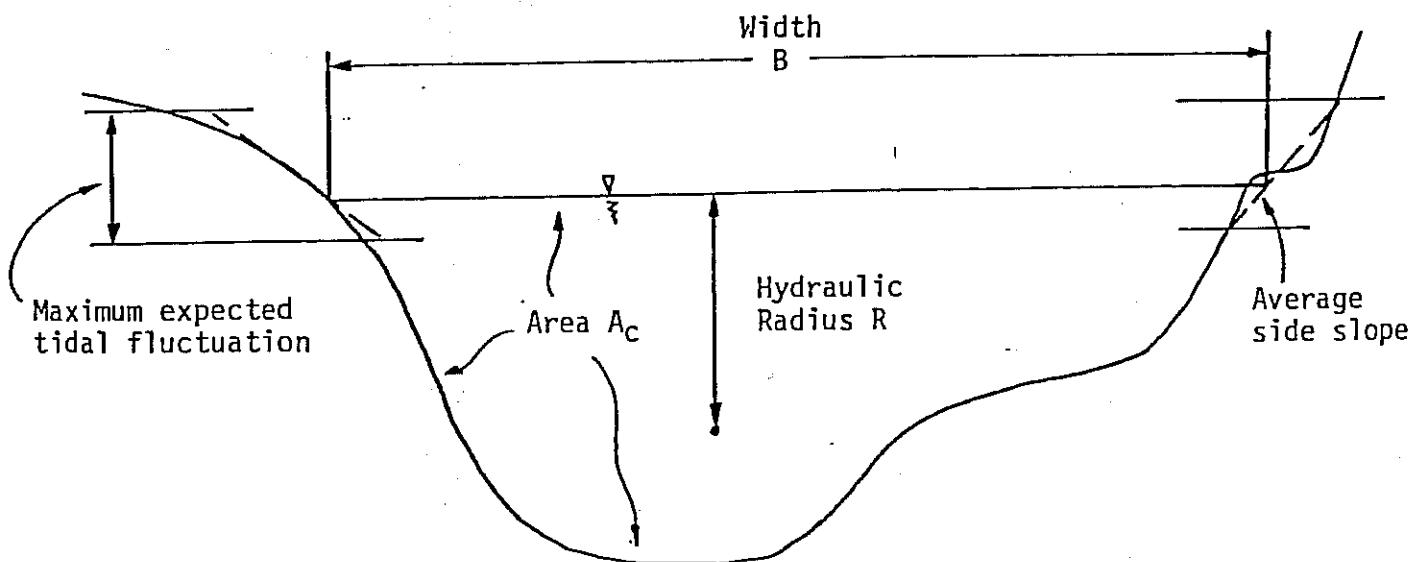
- The initial area (A_n) is equal to the wetted area at mean sea level (MSL)
- The initial depth (H) is representative of mean depth below MSL and is consistent with the initial volume V (i.e., $V=H \cdot A_n$)
- The slope (S_n) is equal to the average change in surface area with depth within the anticipated tidal range (i.e., $A_n = A_0 + S_n \Delta H$)

The channels represent the significant flow paths between nodes. Parallel flow paths can be represented by a single composite channel or a single complex flow path can be represented by two or more channels. In either case, the channels must represent the combined hydraulic capacity of the flow paths connecting adjacent nodes. The channel parameters should be selected such that:

- The length is the actual distance between nodes along the flow path.
- The width (B) is the width of the channel representing the flow path at MSL.
- The hydraulic radius (R) is the hydraulic depth referenced to MSL of the channel and is consistent with the conveyance area A_c (i.e., $A_c = B \cdot R$)



SCHEMATIC OF LINKS AND NODES



MODEL REPRESENTATION OF A TYPICAL CROSS-SECTION

FIGURE II-1

- The side slope (S_c) is the average change in channel width with depth over the anticipated tidal range (i.e., $B=B_0+S_c \cdot \Delta H$)

The development of the model representation of the prototype system should be based upon the spatial resolution required by the project. In selecting the spatial resolution, it is important to remember that computer requirements (computer's memory and simulation time) increase significantly with increased detail so unnecessary detail should be avoided.

II.2 HYDRODYNAMIC MODEL

The model is designed to solve the basic equation of continuity and one-dimensional dynamic fluid flow for the general network of nodes and interconnecting channels. The program performs a numerical integration of the equation of motion and the equation of continuity, stepping forward in time. The results are time histories of velocities and flows in each channel and the heads at each node.

The governing equations of tidal flow in a one-dimensional channel are the equation of continuity,

$$\frac{\partial H}{\partial t} = - \frac{1}{B} \frac{\partial(uA)}{\partial x} \quad \text{II-1}$$

where H = tidal stage

B = channel width

u = velocity

A = cross-sectional area

x = distance along the channel

t = time

and the equation of motion,

$$\frac{\partial u}{\partial t} = - u \frac{\partial u}{\partial x} - k u |u| - g \frac{\partial H}{\partial x} + F_w \quad \text{II-2}$$

where g = acceleration due to gravity

k = friction coefficient = $g(n/1.49)^2 R^{-4/3}$

R = hydraulic radius

n = Mannings roughness coefficient

$$F_w = \text{wind force} = .0000015 W_x^2/R$$

W_x = wind velocity component

These equations assume that the wavelength is much longer than the channel depth and that the effects of Coriolis acceleration is negligible.

A direct discretization of the equation of motion to the grid system used in the study is difficult because of the presence of the velocity gradient term, $\partial u / \partial x$. That term can be replaced by considering continuity, i.e.,

$$\frac{\partial H}{\partial t} = - \frac{1}{B} \frac{\partial(uA)}{\partial x} = - \frac{1}{B} (A \frac{\partial u}{\partial x} + u \frac{\partial A}{\partial x})$$

Then $\frac{\partial u}{\partial x} = \frac{1}{A} (-B \frac{\partial H}{\partial t} - u \frac{\partial A}{\partial x})$

assuming that

$$B \frac{\partial H}{\partial t} = \frac{\partial A}{\partial t}, \quad u \frac{\partial A}{\partial x} = uB \frac{\partial H}{\partial x}$$

then

$$\frac{\partial u}{\partial x} = \frac{1}{A} (-\frac{\partial A}{\partial t} - uB \frac{\partial H}{\partial x})$$

Thus the equation of motion becomes

$$\frac{\partial u}{\partial t} = \frac{u}{A} \frac{\partial A}{\partial t} - Ku|u| + (\frac{u^2 B}{A} - g) \frac{\partial H}{\partial x} + F_w \quad \text{III-3}$$

Equation III-3 lends itself readily to the particular form of the Runge-Kutta's numerical solution used in the model. Descriptions of the numerical solution technique can be found in reports by Water Resources Engineers and the California Department of Water Resources (1,2).

Model Boundary Specifications

The hydrodynamics of the estuary are computed using these relationships and the model representation of the system geometry coupled with the tidal stage relationship imposed at the seaward boundary and the inflows to and withdrawals from the system.

Tide Specification

Two methods are available for defining the tidal boundary specification. Method 1 employs a sinusoidal waveform equation,

$$\begin{aligned} H_t &= A_1 + A_2 \sin(wt) + A_3 \sin(2wt) + A_4 \sin(3wt) \\ &= A_5 \cos(wt) + A_6 \cos(2wt) + A_7 \cos(3wt) \end{aligned}$$

where H_t = tidal stage at time t

w = tidal period

t = time

A_1 through A_7 = coefficient determined by a least squared fit of 6 input tidal stage/time pairs

In the repetitive dynamic solution mode where the model is run for two or more tidal cycles with the same boundary conditions, coefficients A_1 through A_7 are determined by a fit of all 6 tidal time/stage pairs and the expression is representative of the entire tide cycle. In the time series mode, one quarter of the tide is fit using 3 adjacent tidal time/stage pairs and is updated at appropriate times as the simulation progresses.

Method 2 uses a cubic spline fit of stage data input at 15 minute intervals.

Inflow and Withdrawals

Inflows to and withdrawals from the system are simply treated as nodal sources and sinks and are incorporated in the flow balance along with the flows of the channels entering the node.

Two special capabilities have been added to the code to reflect operation and agricultural consumption in the San Francisco Bay Delta.

The term channel depletion refers to the net water consumption (i.e., net agricultural, municipal and industrial withdrawals, rainfall and evaporation) within the Delta system. The channel depletions have

been quantified by the DWR and others based on many years of experience and have been assigned to each node as a fraction of the total Delta consumption. These channel depletion ratios are incorporated in the model so that only the total channel depletion need be entered.

Clifton Court Operation

The California Aqueduct withdrawals are made from the Delta at Clifton Court. The entrance to the Clifton Court forebay is controlled by a gate which allows flow into the forebay only. This gate is represented by a hydraulically equivalent channel designed to approximate the head losses through the control structure. The flow into Clifton Court is computed based on the channel hydraulic characteristic and the head difference between Old River and Clifton Court but constrained by one or more of the following:

1. Flow is allowed into Clifton Court only.
2. Flow rate is limited to a maximum of 12,000 cfs.
3. Flow is allowed into Clifton Court only when the control structure is open. The control structure is opened by one of the following options:
 - a. The time of opening and closing may be specified directly.
 - b. A control node may be specified. The structure is opened only when the stage at the control node is falling.

II.3 WATER QUALITY MODEL

Having generated inter-nodal flows by the hydrodynamic module, the time history of heat and various water quality parameters can be traced through the estuary by means of the water quality module. The modeling approach is based on the assumption that the dynamics of each chemical and biological component can be expressed by the law of conservation of mass and the kinetic principle.

The fundamental principle of conservation of heat and mass is used to derive the following differential equation model for the dynamics of heat and biotic and abiotic materials which are passively transported with the movement of water.

$$V \frac{\partial C}{\partial t} = \Delta x \cdot Q_x \cdot \frac{\partial C}{\partial x} + Q_i \cdot C_i - Q_o \cdot C \pm V \cdot S \quad \text{II-4}$$

where C = thermal energy or constituent concentration at any node

V = volume of the node

t = time coordinate, seconds

X = space coordinate, feet (distance along the channel axis)

Q_X = channel flow rate

Q_i = point and nonpoint inflows to the node

C_i = inflow thermal energy or constituent concentration

Q_o = withdrawals from the node

S = all other sources and sinks

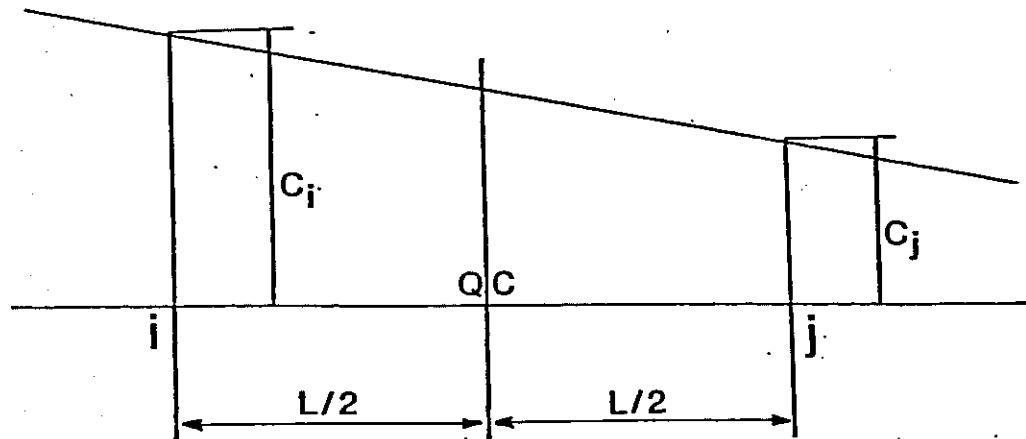
Advection Transport and Diffusion

The principle mechanism for transport between the system nodes is advective flow. Other phenomena such as eddy diffusion is much less important and ignored in the model. The advective flows composed of tidal flows and net transport due to inflows and withdrawals is provided by the hydrodynamic module.

Since the water quality at any given time is assumed uniformly mixed throughout the entire node, care must be taken to select the appropriate concentration of the advecting flow.

A typical channel connecting junctions i and j and a possible concentration profile along that channel is shown schematically below. The values C_i and C_j are known at the junctions, and C will be some function of these values.

The key to the proper movement of material lies in the distance traveled by the water during the time step relative to the distance between nodes (i.e., $V\Delta t/L$, where v = channel velocity, Δt = time step, and L = channel length).



Concentration Profile
Typical Channel and Junctions

If $V\Delta t/L$ were equal to one, the value C_j would be expected to move to junction j , while C_j would in turn move further along. But since $V\Delta t/L$ is seldom exactly equal to one, the proper selection of C should consider the travel time between nodes. Improper selection of C usually results in improper mass transport than occurs in nature, a process described as "numerical mixing". The potential for the numerical mixing is greatest in those regions having the steepest concentration gradient and is more significant for conservative constituent parameters which are subject to long term buildup.

Other mixing phenomena such as eddy diffusion are much less important than advection and generally less significant than numerical mixing, therefore it is ignored in the model.

The Stockton model utilized the following procedure to minimize numerical mixing and maintain numerical stability.

- Limit the length of the fundamental time to the minimum nodal residence time
- Develop a link-node representation in the region of primary interest that has nodes of approximately the same residence time and a gradual transition to the larger nodes of regions of secondary interest.
- Compute the advected concentration based on nodal residence times using the expression:

$$C = C_j \cdot R + C_j \cdot (1-R)$$

where $R = 2 \cdot \Delta t / (T_i + T_j)$

Δt = the time step increment

T_i, T_j = residence time in nodes i and j

Additionally, R is constrained by $.67 \leq R \leq 1.0$

Based on results of the Stockton Ship Channel modeling project coupled with experience with other applications, this procedure has proven to be numerically stable and produce results which compare favorably with observed water quality conditions.

Water Quality Parameters

The water quality model simulates the following water quality parameters:

1. Temperature
2. Total dissolved solids
3. Coliform bacteria
4. Carbonaceous BOD
5. Organic detritus
6. Ammonia nitrogen
7. Nitrate nitrogen

8. Phosphate phosphorus
9. Phytoplankton type 1
10. Phytoplankton type 2
11. Dissolved oxygen

The relationship between these parameters is shown on Figure II-2.

The temporal and spatial distribution of these parameters are computed using equation II-4 with the source-sink term (i.e., V-S) tailored to the specific characteristics of the parameter. The source and sink term for these parameters is described below.

Water Temperature

The dominant external heat source and sink is the exchange at the water surface. This exchange is controlled by the water temperature and meteorological conditions. The rate of heat transfer is computed as the sum of the following heat exchange components:

$$H_n = H_s - H_{sr} + H_a - H_{ar} \pm H_c - H_{br} - H_e$$

where H_n = the net heat transfer

H_s = the short wave solar radiation arriving at the water surface

H_{sr} = the reflected short wave radiation

H_a = the long wave atmospheric radiation

H_{ar} = the reflected long wave radiation

H_c = the heat transfer due to conduction

H_{br} = the back radiation from the water surface

H_e = the heat loss due to evaporation

The rate of change in temperature due to this heat flux becomes:

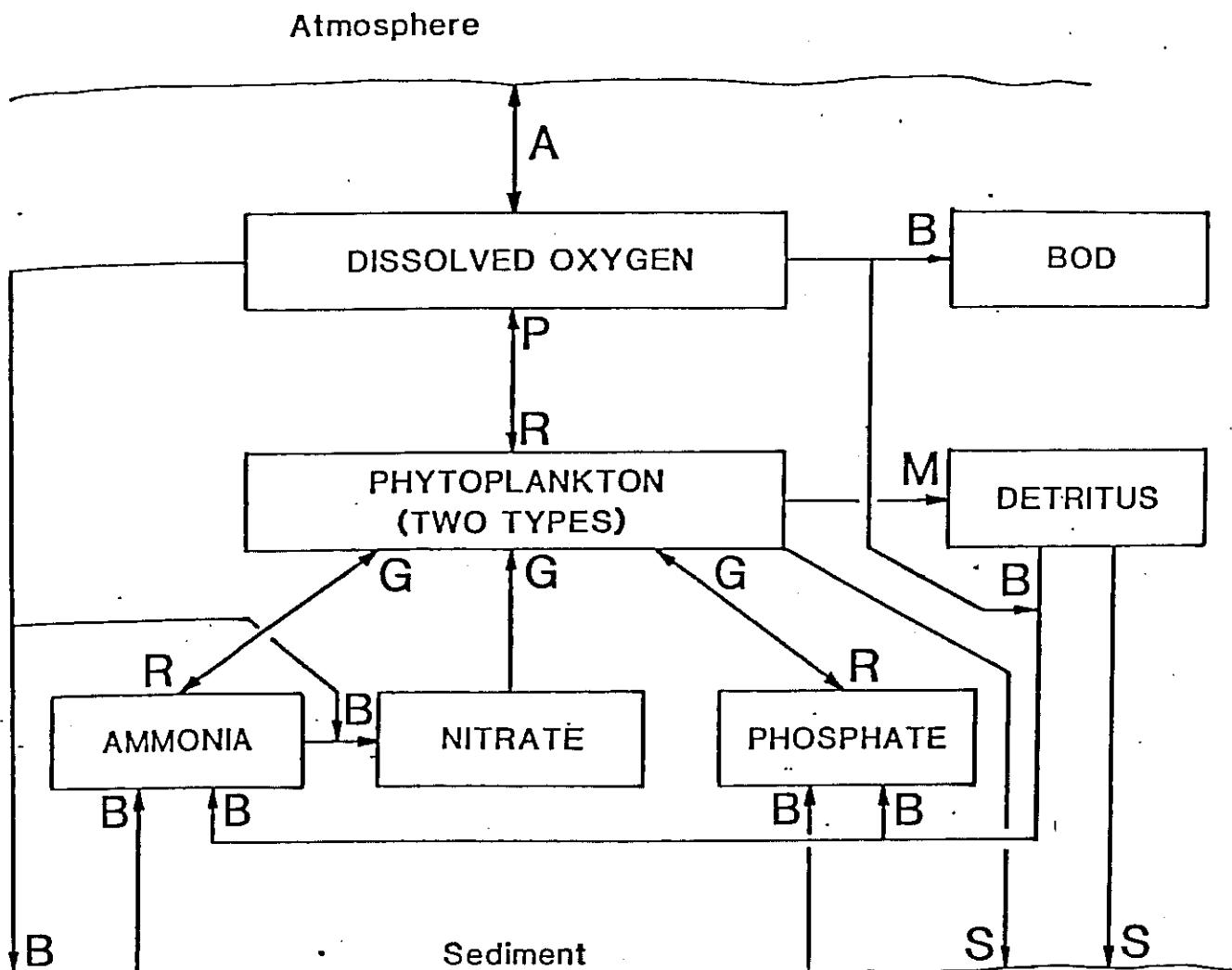
$$\frac{\partial T}{\partial t} = \frac{A_i \cdot H_n}{D_i \cdot \rho \cdot c}$$

where A_i = surface area of the node

D_i = average depth of the node

ρ = density of water

c = specific heat of water



A Aeration

G Growth

P Photosynthesis

B Bacterial Decay

R Respiration

S Settling

M Mortality

FIGURE II-2. Interactions and coupling between the Stockton Ship Channel Water Quality Model parameters

Total Dissolved Solids

Total dissolved solids (TDS) is considered a conservative parameter, therefore there are no additional sources and sinks.

Coliform Bacteria

Coliform bacteria are subject to die off which occurs at a rate subject only to temperature. The rate of change in the coliform bacteria level due to die off is computed by:

$$\frac{\partial E}{\partial t} = -K_e \cdot E$$

where E = coliform bacteria level

K_e = coliform bacteria die off rate at the ambient temperature

The rate of coliform die off is dependent on the ambient temperature. The adjustment for temperature is computed by:

$$K_e = K_{20} \cdot Q_{10}^{(T-20)}$$

where K_{20} = coliform bacteria die off rate at 20° celsius

Q_{10} = temperature adjustment coefficient

All rate coefficients except for phytoplankton growth are adjusted to the ambient temperature by this method.

Carbonaceous BOD

Like coliform bacteria, carbonaceous BOD is subject to first order decay. The rate of change is computed by:

$$\frac{\partial L}{\partial t} = -K_1 L$$

where L = BOD concentration

K_1 = BOD decay rate at the ambient temperature

Organic Detritus

The organic detritus concentration decreases by first order decay and by settling. If phytoplankton mortality is specified, the dead phytoplankton is converted directly to detritus. The rate change in detritus is computed by:

$$\frac{\partial D}{\partial t} = -K_d D + \Sigma p_m \cdot P - S_D \cdot D \cdot F_S$$

where D = detritus concentration

K_d = detritus decay rate at the ambient temperature

p_m = phytoplankton mortality rate

P = phytoplankton concentration

S_D = settling velocity normalized to depth

F_S = settling velocity reduction factor. The factor decreases as the flow velocity and turbulence increase and is determined by:

$$F_S = (1-v)^2 \quad v < 1 \text{ meter/sec}$$

$$\text{or} \quad F_S = 0 \quad v \geq 1 \text{ meter/sec}$$

v = mean velocity of channels entering the node

Ammonia Nitrogen

Ammonia is subject to first order decay and is consumed with phytoplankton growth. Sources of ammonia include releases from the bottom sediments, detritus decomposition and phytoplankton respiration. The rate of change is computed by:

$$\frac{\partial NH_3}{\partial t} = -K_n \cdot NH_3 + K_d \cdot D \cdot NFD + SN + \Sigma P \cdot (pg \cdot Fn - pr) \cdot NFP$$

where NH_3 = ammonia concentration as N

k_n = ammonia decay rate at the ambient temperature

NFD = nitrogen fraction of detritus

SN = benthic ammonia nitrogen release rate

pg = phytoplankton growth rate at the ambient temperature

pr = phytoplankton respiration rate at the ambient temperature

fn = ratio of ammonia to total nitrogen

NFP = nitrogen fraction of phytoplankton

Nitrate Nitrogen

Nitrate nitrogen is a product of ammonia decay and is consumed with phytoplankton growth. The rate of change in nitrate is computed by:

$$\frac{\partial \text{NO}_3}{\partial t} = K_n \cdot \text{NH}_3 - \Sigma P \cdot pg \cdot (1-Fn) \cdot NFP$$

where NO_3 = nitrate nitrogen concentration

Phosphate Phosphorus

Phosphate phosphorus is consumed with phytoplankton growth and is released with phytoplankton respiration. Other sources include releases associated with detritus decay and bottom sediment decomposition. The rate of change due to these sources and sinks is computed by:

$$\frac{\partial \text{PO}_4}{\partial t} = K_d \cdot D \cdot PFD + SP + \Sigma P \cdot (pg-pr) \cdot PFP$$

where PO_4 = phosphate concentration as phosphorus

PFD = phosphorus fraction of detritus

SP = benthic phosphorus release rate

PFP = phosphorus fraction of phytoplankton

Phytoplankton Types 1 and 2

Phytoplankton increase by growth and decrease by respiration, settling and mortality. The rate of growth is determined using the limiting nutrient (including light) concept. The rate of increases is computed by:

$$\frac{\partial P}{\partial t} = -Sp \cdot Fs + P \cdot (pg-pr-pm)$$

where S_p = phytoplankton settling rate normalized to depth

$$p_g = p_{max} \cdot RT \left| \frac{C}{C_2+C} \left(\frac{LI}{LI_2+LI} \right) \right|_{min}$$

p_{max} = maximum growth at 20° celsius

RT = temperature adjustment factor

C = limiting nutrient concentration (i.e., $\text{NO}_3 + \text{NH}_3, \text{PO}_4$)

C_2 = concentration at which phytoplankton grows at half the maximum rate

LI = light intensity

LI_2 = light intensity at which phytoplankton grows at half the maximum rate

Determining the growth rate as a function of the limiting nutrient is straightforward since uniform concentration within the node is assumed. Light limitation, however, is more complicated since the light intensity varies with depth as a function of the light attenuation characteristic of the water. To determine the proper growth limitation factor due to light, the light limitation ratio (RL) is integrated over depth by:

$$RL = \int_h^\infty \frac{LI}{LI_2+LI} dh$$

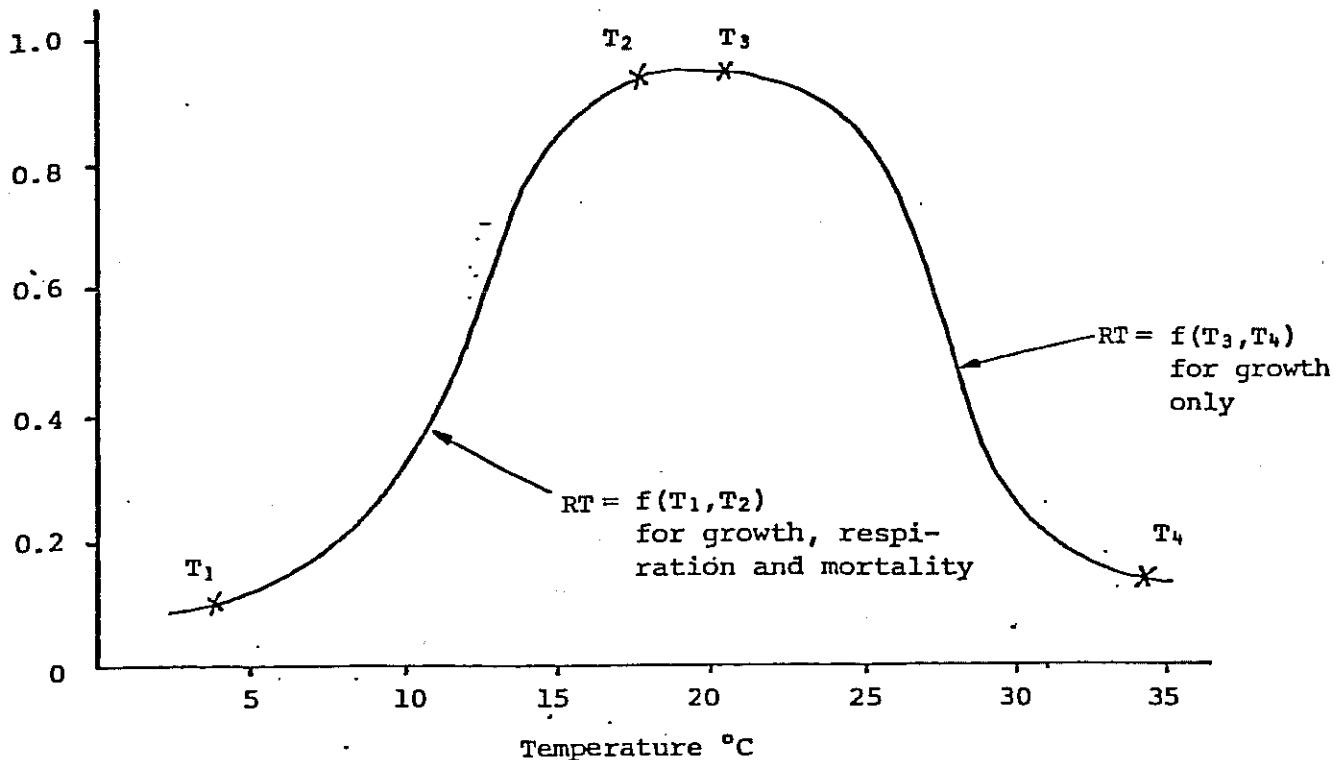
where h = the water depth

$$LI = LI_0 e^{-kh}$$

LI_0 = surface light intensity

K = light extinction coefficient

Unlike the temperature adjustment factors used to adjust the rate coefficients of other parameters, the phytoplankton growth rate adjustment utilizes the temperature limit approach which assumes that the rate at which a reaction takes increases to a maximum and then begins to decrease. Two exponential expressions similar to those depicted below are used to define the temperature tolerance functions used to modify the growth and respiration rates. The temperatures, T_1 and T_4 , are the lower and upper tolerance limits, respectively, for growth, and T_2 and T_3 , define the optimum range at which the growth is a maximum. The temperature adjustment for respiration and mortality are held constant at the maximum beyond temperature T_3 .



Rate Coefficient Temperature
Adjustment Function

Dissolved Oxygen

Dissolved oxygen sources include exchange at the water surface (reaeration) photosynthetic production. Oxygen sinks include water surface exchange (when the oxygen concentration exceeds saturation) phytoplankton respiration, ammonia, detritus, and BOD decay and uptake by the bottom sediment. The rate of change due to these sources and sinks is computed by:

$$\frac{\partial O_2}{\partial t} = -k_1 L - K_d \cdot D \cdot O_2 D - K_n \cdot NH_3 \cdot O_2 N - O_2 R \cdot P \cdot pr + O_2 P \cdot P \cdot pg$$

$$- SO + k_2 (O^* - O_2)$$

where O_2 = dissolved oxygen concentration

$O_2 D$ = amount of oxygen consumed with detritus decay

$O_2 N$ = amount of oxygen consumed with the conversion of ammonia to nitrate

O_2R = amount of oxygen consumed with phytoplankton respiration

O_2P = amount of oxygen produced with phytoplankton growth

S_0 = benthic oxygen demand

K_2 = reaeration coefficient

O^* = dissolved oxygen concentration at saturation

The reaeration rate is computed using one of two methods. Method 1 utilizes a wind velocity formulation of the form:

$$K_2 = (a + bW^2)/h$$

where a, b = empirical coefficients

W = wind speed

Method 2 is based on channel hydraulics and uses the O'Conner-Dobbins formulation:

$$K_2 = \frac{(D_m v)^{1/2}}{h}$$

where D_m = molecular diffusion coefficient

v = flow velocity (channel area weighted velocity of all channels entering the node)

The larger of the two coefficients is selected for the reaeration computation.

III. MODEL STRUCTURE

The Stockton ship channel project model is composed of two computer programs which are connected by a tape interface. The structure of these two programs and the function of the program routines is described in this chapter.

III.1 HYDRODYNAMIC MODEL

The hydrodynamic model is composed of the main routine HMAIN, a block data and 20 subroutines. The relationship between routines is shown in Figure III-1 and a brief description of the routines is provided below in the sequence of computation. For discussion purposes, the model can be separated into the simulation section and the post processing section (i.e., plotting and accuracy assessment).

Hydrodynamic Simulation

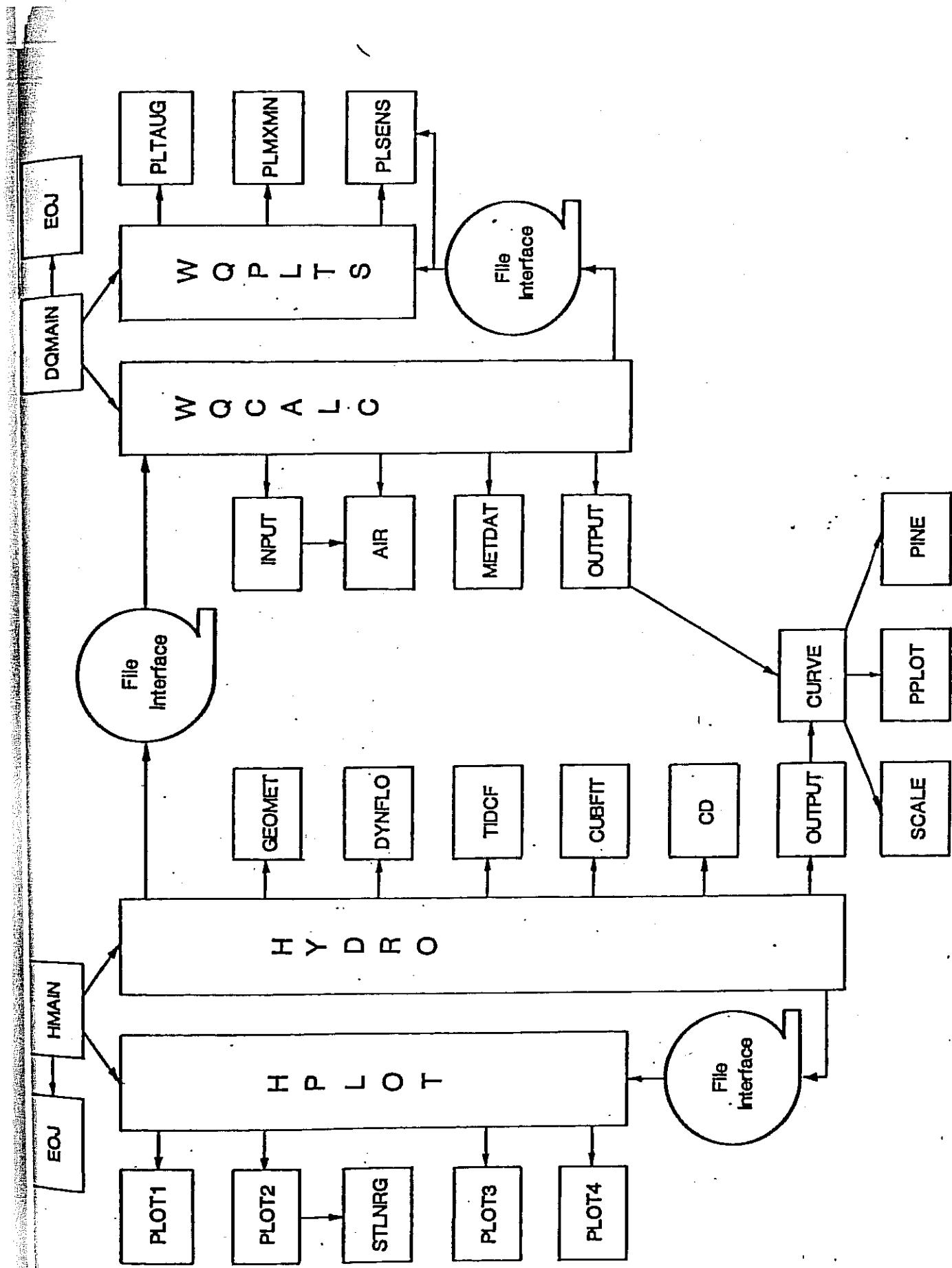
In the simulation mode the main program calls HYDRO which controls the hydrodynamic calculations. It begins by first reading title and control information for printing and plotting, and then calling GEOMET. GEOMET reads channel and node configurations, including interconnectivity of nodes and channels, and computes invariant node and channel data before returning control to HYDRO.

HYDRO then calls NUMBER which orders the nodes to produce a more efficient matrix configuration for tidally averaged quality computations. (The tidally averaged quality model is not described in this documentation.) The original numbering system is retained for output purposes. Control returns to HYDRO which prints the invariant geometric data and stores duplicates on disk files for later use in the quality models.

The model then cycles through the following steps as often as required to compute the hydrodynamics for each hydrologic condition. HYDRO calls either CUBFIT or TIDCF to fit the tide specifications with a polynomial which describes the time-stage relationship at a seaward boundary and then subroutine CD to input the delta channel depletion ratios. Control is returned to HYDRO which then reads the remaining boundary conditions. At this point the major daily time step and quality time step loops are initiated and subroutine DYNFLO is called.

DYNFLO solves the equations of motion and continuity to determine fundamental hydrodynamic properties including velocities, flows, volumes, depths, surface areas and channel cross-sectional areas. DYNFLO is called repeatedly to compute hydrodynamic properties for each simulation day of the hydrologic period.

FIGURE III-1. Estuary Hydrodynamic and Water Quality Model Subroutine Structure



Control then returns to HYDRO which averages the results of the final day of simulation over user specified intervals and stores the averages on disk files to be used as input to the dynamic water quality model. Finally, the subroutine OUTPUT is called which prints the results and controls the sequencing of subroutines CURVE, PINE, PPLOT and SCALE which produce the user specified printer plots. Simulated velocity flows and stages for selected channels and nodes are also saved on disc files for plotting and accuracy assessment.

Post Processing

In the post processing mode, subroutine HPLOT is called to plot simulation results and to evaluate the accuracy of the computed water surface elevations. These routines utilize standard CALCOMP calls and require an increment plotter or equivalent. HPLOT reads simulated stages, flows and velocities from the disc files written in HYDRO and plot controls and observed data from the input file. Four plot options are available.

With plot option 1, PLOT1 is call to plot a time series of computed and observed stage at one location. Under option 2, PLOT2 is call to plot the computed versus observed stage at a single node point. After the data are plotted, STLNRG is called to perform a least squares fit of the data and to evaluate the accuracy of the prediction (e.g., standard deviation, slope, RMS error, etc.).

With plot option 3, PLOT3 is called to plot computed water surface elevations at selected nodes. With plot option 4, PLOT4 is called to plot either channel velocity or flow at up to three locations. Options 3 and 4 do not utilize any observed data. Control will cycle through HPLOT until all desired plots are complete.

Upon return to the main program from either HPLOT or HYDR, EOJ is called to skip any unused data before continuing with the next simulation.

III.2 WATER QUALITY MODEL

The water quality model is composed of a main routine DQMAIN, a block data and 12 subroutines. The relationship between routines is shown in Figure III-1. The following paragraphs describe the function of these routines in the sequence of computation. As in the hydrodynamic model, the water quality model contains both a simulation section and a post processing section.

Water Quality Simulation

In the simulation mode, the main program calls WQCALC which controls the water quality computations. It begins by calling subroutine INPUT. Within INPUT, the job title, simulation controls,

file assignments and output controls are read and processed. Next, the data from the hydrodynamic model interface tape are read and processed. The initial water quality data are then read and control is returned to WQCALC. Within WQCALC, the boundary condition loop is entered and INPUT is called again to read and process the condition to be simulated. These conditions include the quality at the seaward boundary, inflow, water quality and the system coefficients.

Upon return to WQCALC, the daily and hourly time step loops are entered. Within the hourly loop, subroutine METDAT is called to input and process the meteorological data. Subroutine METDAT reads a set of meteorological conditions and then computes the various components of the heat exchange at the air-water interface, including solar radiation, back radiation and evaporative and convective heat loss.

Upon return to WQCALC, the hourly hydrodynamic conditions are read and the reaeration coefficients and nodal residence times are computed. The seaward boundary is imposed and the basic time step loop is entered. The intermediate nodal volumes are then computed and the integration loop is entered. Within the integration loop, the rate of change in each parameter due to advection, inflows, withdrawals, seaward boundary influences and volume changes is computed. Next, the rates of change due to growth, respiration, decay, etc. for each parameter are computed. Depending on the type of integration; one, two, or four passes are made through the integration loop. Upon completion of the integration process, the end of time step concentrations are computed and a check is made for negative concentrations. A check of the output controls is made to see if OUTPUT is to be called to print the simulation results.

Before terminating the hourly and daily time step loops, the simulation results are written on disc files for post processing and are stored in the concentration profile and time series printer plot arrays.

When the end of the boundary condition loop is reached and a final call to output is made to plot concentration profile and time series plots Subroutine OUTPUT controls the sequencing of CURVE, PINE, PPLOT and SCALE, which produce the printer plots.

Post Processing

In the post processing section, subroutine WQPLTS is called to plot the simulation results and field observations of quality. WQPLTS reads channel lengths and quality simulation results from the disc file written in DQCALC. Controls are then read to select one or more of the three available plot options.

Plot option 1 utilizes PLTAVG to plot the average water column concentration as either a time series or as a longitudinal profile. As an option, observed data may be read and plotted.

Under plot option 2, PLMXMN is called to plot the maximum and minimum simulated diurnal concentration as either a time series at a

single node or as a longitudinal profile. As an option, quality observation may be read and plotted.

With plot option 3, PLSENS is called to plot averaged results from two simulations. Time series or longitudinal plots may be specified.

Upon return to the main program from either DQCALC or WQPLTS, EOJ is called to skip any unused data before continuing with the next simulation.

IV. DATA PREPARATION

The descriptions of the data requirements provided in this chapter outline the card groups (the word card refers to a card image record in a data file or an actual tab card) and format specifications required to set up the input decks for the hydrodynamic and water quality model and the various plot options. The description usually includes a statement defining the purpose of the card and considerations which should be kept in mind when preparing the data. Each variable is defined along with the column field, the FORTRAN variable name, the different values each variable may assume. Free field input is also utilized. Some variables simply indicate whether or not a program option is to be used by assigning numbers such as -1, 0, 1. Other variables contain values which express the variable magnitude. For these a + sign is shown in the description under "value" and the numerical value of the variable is entered as input. These card descriptions together with the illustrative example enable the user to set up and run the estuary hydrodynamics and models.

IV.1 HYDRODYNAMIC MODEL DATA REQUIREMENTS

The input requirements for the hydrodynamic model described below fall into the general categories of:

- Control specifications for computational options and output formats;
- Physical and geometric characteristics of the node-channel representation of the estuary;
- Tidal time-stage relationships at seaward boundaries;
- Meteorological and climatological data;
- Point inflows (including channel depletion ratios) and outflows;
- Nonpoint inflows or other line sources;
- Respecification of manning coefficients for selected channels; and
- Plot controls and observed data for plotting.

Card Type 1 - Job Headings (two required)

These headings describing the simulation will be printed at appropriate locations within the output. The second heading will be updated when boundary conditions are specified (see Card Type 15).

Field	Variable	Value	Description
1-80	TITLE	alpha	Main heading
1-80	TITL	alpha	Sub heading

Card Type 1a - Simulation/Plot Selection (required)

This card is used to select either the plot or simulation option. This plot option required data contained on Files 7, 8 or 9 generated by a preceding or previous hydrodynamic simulation. Signify the end of the run by entering a zero in both field.

Field	Variable	Value	Description
1-5	NHYD		Hydrodynamic simulation option control
		0	No hydrodynamic simulation, omit Card Types 2 through 23
		1	Perform hydrodynamic simulation
6-10	NPLT		Stage, flow and velocity plot option control. Plots specified under this option are plotted on an incremental plotter such as a CALCOMP. This option does not affect printer plots which may be specified within the hydrodynamic data set.
		0	No plots, omit Cards 24 through 26
		1	Plot simulated velocities contained on file 7 (see Card 9)
		2	Plot simulated flows contained on file 8 (see Card 9)
		3	Plot simulated stage contained on file 9 (see Card 10)

Card Type 2 - Simulation and Input/Output Controls (required)

These controls define the length of simulation and the type and quantity of output. Both printer plot options and incremental plotter options are available. References to plots other than "printer plots" refer to incremental or digital plotter plots.

Field	Variable	Value	Description
1-5	NBC	+	Number of sets of hydraulic boundary conditions to be simulated (1 to 48 allowed).
6-10	NHPRT	+	Number of nodes specified for printout (1 to 30 allowed)
11-15	NCPRT	+	Number of channels specified for printout (1 to 30 allowed)
16-20	NSTAGE	+	Number of tidal stage printer plots (5 maximum, 3 nodes per plot)
		0	No stage plots, omit Card 6
21-25	NTFLOW	+	Number of channel velocity printer plots (5 maximum, 3 channels per plot)
		0	No velocity plots, omit card 7
26-30	NTSL	+	Number of nodes included in profile printer plot of tidal range and time of high water (2 to 48 allowed)
		0	No profile plots, omit Card Type 8
31-35	IVQ		Output control for channel flow and velocity plot files. (See Cards 1a, 24, 25 and 26).
		0	No flow or velocity file will be written, omit card type 9
		1	Only the velocity file will be written
		2	Only the flow file will be written
		3	Flow and velocity file will be written
36-40	NVQ	+	Number of channels for which velocity and flow results will be saved for plotting (1 to 32 allowed)
		0	No velocity and flow file, omit Card 9

41-45	NHD	+	Number of nodes for which stage results will be saved for plotting (1 to 32 allowed)
		0	No stage file, omit Card 10.
46-50	NDYNAM	+	File unit for storing hourly hydrodynamic results for use in the dynamic water quality model
		0	No dynamic quality simulation anticipated
51-55	NSTEAD	+	File unit for storing daily averaged hydrodynamic results for use in the tidally averaged quality model
		0	No tidally averaged quality simulation is anticipated
56-60	NN	+	Node number from which to begin internal renumbering. The renumbering provides a set of internal node numbers for use in the tidally averaged quality model. The node selected to begin renumbering should be located at the lengthwise boundary.
		0	No tidally averaged quality simulation is anticipated (i.e., NSTEAD=0)

Card Type 3 - Tidal Cycle Control (1 to 3 required)

The number of cycles determines the mode of operation. In the dynamic steady state mode, the model is run for two or more tidal cycles with the same boundary conditions until a repetitive solution is reached. This mode is used to provide a converged solution for a given set of conditions or for the initial solution for a time series solution. The time series mode is used to provide a dynamic history of Delta hydrodynamics over an extended time period. In this mode, each day is simulated only once using a tide and hydrology which is updated daily. A maximum of 16 values can be specified per card, repeat card as necessary until NBC (Card 2) values have been specified.

Field	Variable	Value	Description
1-5	MDAY(1)	+	Number of tidal cycles for each set of boundary conditions.
6-10	MDAY(2)	+	
.	MDAY(NBC)	+	
76-80			

Card Type 4 - Node Printout Control (1 or 2 required)

A maximum of 16 nodes can be specified per card, repeat card if NHPRT (Card 2) exceeds 16.

Field	Variable	Value	Description
1-5	JPRT(1)	+	Nodes specified for stage printout.
6-10	JPRT(2)	+	
:	JPRT(NHPRT)	+	
76-80			

Card Type 5 - Channel Printout Control (1 or 2 required)

A maximum of 16 channels can be specified per card, repeat card if NCPRT (Card 2) exceeds 16.

Field	Variable	Value	Description
1-5	NPRT(1)	+	Channels specified for velocity and flow
6-10	NPRT(2)	+	printout.
:	NPRT(NCPRT)	+	
76-80			

Card Type 6 - Tidal Stage Printer Plot Control (optional)

The nodes specified here must have been included in the JPRT array (Card 4). NSTAGE (Card 2) cards required, omit if NSTAGE is zero.

Field	Variable	Value	Description
1-5	NJPLOT(1)	+	Three nodes for stage plots
6-10	NJPLOT(2)	+	
11-15	NJPLOT(3)	+	

Card Type 7 - Channel Stage and Velocity Printer Plot Control (optional)

The channels specified here must have been included in the NPRT array (Card 5). NCPRT (Card 2) cards required, omit if NCPRT is zero.

Field	Variable	Value	Description
1-5	NCPLOT(1)	+	Three channels for velocity
6-10	NCPLOT(2)	+	plots
11-15	NCPLOT(3)	+	

Card Type 8 - Tide Range and Time Profile Printer Plot Control
(optional)

The diurnal tidal range and time of high water of up to 48 nodes may be plotted against an arbitrary horizontal scale. A maximum of 16 nodes can be specified per card, repeat cards as necessary until NTSL (Card 2) nodes have been specified. Omit if NTSL (Card 2) is zero.

Field	Variable	Value	Description
1-5	JTR(1)	+	Nodes to be included in the profile
6-10	JTR(2)	+	plots.
.	JTR(NTSL)	+	
76-80			

Card Type 9 - Velocity and Flow Plot Control (optional)

These velocity and flow plot files contain simulation results at 15 minute intervals for use by the plot routines. A maximum of 16 channels can be specified per card, repeat card as necessary until NVQ (Card 2) channels have been specified. Omit if IVQ or NVQ (Card 2) is zero.

Field	Variable	Value	Description
1-5	NCVQ(1)	+	Channel number specified for velocity
6-10	NCVQ(2)	+	and/or flow output.
.	NCVQ(NVQ)	+	
76-80			

Card Type 10 - Stage Plot Control (optional)

The stage plot file containing simulation results at 15 minute intervals for use by the plot routines. A maximum of 16 nodes can be specified per card, repeat card as necessary until NHD (Card 2) nodes have been specified. Omit if NHD (Card 2) is zero.

Field	Variable	Value	Description
1-5	JHD(1)	+	Node numbers specified for stage plots.
6-10	JHD(2)	+	
.	JHD(NHD)	+	
76-80			

Card Type 11 - Time Step Control (required)

Field	Variable	Value	Description
1-5	DELT	+	Hydrodynamic time step increment, sec. The hydraulic time step must be smaller than minimum channel stability time and an even factor of 900 seconds.
6-10	DELTQ	+	Quality time step increment, hour. The quality time step is normally 1 hour and is the basic printout interval and the interval over which the results are averaged and stored for use in the dyna- mic quality model.

Card Type 12 - Tidal Boundary Specifications (required)

Field	Variable	Value	Description
1-5	JEX		Node number with specified tidal stage relationship.
		+	Tide will be defined by a fit of the time and stage of the tidal peaks input on Card Type 17a.
		-	Tide will be defined by a fit of stage data input at 15 minute intervals input on Card Type 17b.
6-10	TIMINC	+	Time adjustment for the input tide, hrs. The high and low water times input on Cards 17a and b will be changed by this amount.
11-15	TIDINC	+	Stage adjustment for the input tide, ft. The high and low water stages input on Cards 17a and b will be changed by this amount.

16-20 PERIOD Tidal cycle period, hrs. The length of the tidal cycle determines how the input time-stage data will be used.

25 If 25 hours is specified, the input time-stage pairs will be fit by a waveform equation such that the stage at hours 0 and 25 are equal.

24 If 24 hours is specified, the waveform equation will be updated as the simulation progresses and the stage at hour zero will generally not equal the stage at hour 24.

21-25 DMIN + Anticipated maximum diurnal range in stage within the estuary, ft. This tide range is used to compute the maximum wave velocity in each channel at high water.

Card Type 12a - Tide Gate Specifications (required)

One card is required for each tide gate.

Field	Variable	Value	Description
Free Field Input	JG	+	Channel number designation for the tide gate.
	END		Signal end of tide gate specification. The END card is required even if no tide gates are specified.
	JG1	+	Nodes joined by the tide gate. Flow is allowed only from JG1 to JG2.
	JG2	+	
	QTF	+	Coefficient in the expression $Q = QTF(H_1 - H_2)^{1/2}$ used to compute the flow through the tide gate.
	ATF	+	Flow area of the tide gate structure used to compute velocity.

Card Type 12b - Clifton Court Control (required)

If Clifton Court operation is specified, water is allowed to flow by gravity into the forebay only when the gate is open. Gate openings are controlled by Cards 12b or 12c.

Field	Variable	Value	Description
Free Field Input	ICC	+	Clifton Court inlet channel
		END	Clifton Court is not being simulated. Omit Card 12c.
	NCC	+	Node representing Clifton Court forebay.
	NCCC	+	Reference node for controlling Clifton Court inlet operation. The Clifton Court inlet will be open only when the tide at the control node NCCC is falling.

Card Type 12c - Clifton Court Gate Schedule (required if ICC,
Card 12b, ≠ END)

Clifton Court operation may be controlled by specifying time of gate opening and closure instead of the control node (NCCC, Card 12b). If this mode of operation is chosen, one card is required for each day of simulation. A slash (/) is required at the end of each line of data if fewer than 10 time pairs are specified.

Field	Variable	Value	Description
Free Field Input	TOF1(1)	+	Time in hours when the gate is opened.
		END	No more gate schedule data.
	TOF2(1)	+	Time in hours when the gate is closed.
	TOF1(2)	+	Additional pairs of opening and closing times. Up to 10 pairs may be specified, per day.
	TOF2(2)	+	

Card Type 13 - Node Geometry (required)

Node numbers may range from 1 to 300. One card is required for each node. Signal end of node data with a zero in field 1-5.

Field	Variable	Value	Description
1-5	J	+	Node number
		0	End of node geometry data
6-15	AREA	+	Water surface area at mean sea level, square feet
16-25	SLOPE	+	Change in surface area with increase in elevation, square feet/foot
		0	Change in surface area with depth will be computed as the side slope times half the length of all channels entering the node.
26-30	DEP	+	Water surface depth referenced to mean sea level, ft.
		0	The depth will be computed as a weighted average of the depths of the channels entering the node.
31-35	X1	+	X and Y coordinates, any unit.
36-40	Y1	+	The X-Y coordinate location of nodes relative to any origin is measured in arbitrary units. Coordinates are required only if wind effects are being simulated (see NTEMP(3), Card 16 and Card Type 19).
41-45	NTEMP(1)	+	Channels entering the node
46-50	NTEMP(2)	+	
.	NTEMP(N)	+	
76-80			

Card Type 14 - Channel Geometry (required)

Channel numbers may range from 1 to 400. One card is required for each channel. Signal end of channel data with a zero in field 1-5.

Field	Variable	Value	Description
1-5	J	+	Channel number
		0	End of channel geometry data
6-15	ALEN	+	Channel length, feet
16-25	WIDTH	+	Channel width at mean sea level, feet
26-35	RAD	+	Hydraulic depth referenced to mean sea level, feet
36-45	COEF	+	Mannings roughness coefficient
46-50	NTEMP(1)	+	Nodes at each end of channel
51-55	NTEMP(2)	+	
56-65	SLOPE	+	Change in width with increase in water surface elevation

Card Type 15 - Printout Subheading (required)

This subheading replaces the title read from the second Card Type 1 and will be printed with the following set of hydraulic conditions.

Field	Variable	Value	Description
1-80	TITL	alpha	Subheading

Card Type 16 - Hydrologic Input Controls (required)

The hydrologic input controls specify which boundary condition data are to be read. All boundary conditions are set to zero until data inputs are specified here and read from Card 17 through 23. Once these data are read, they remain in effect until they are respecified for subsequent hydrologic periods.

Field	Variable	Value	Description
1-5	NTEMP(1)	1	Read new tide description
		0	Omit Card Types 17a and b. Use tide description from previous hydrologic period.

6-10	NTEMP(2)	1	Read new evaporation data
		0	Omit Card Type 18. Use evaporation data from previous hydrologic period.
11-15	NTEMP(3)	1	Read new wind velocity and direction
		0	Omit Card Type 19. Use wind data from previous hydrologic period.
16-20	NTEMP(4)	2	Read new channel depletion and point inflow and withdrawal data.
		1	Read point inflow and withdrawal data only. Omit Card Types 20a and 20b.
		0	Omit Card Type 20a, 20b and 20c. Use data from previous hydrologic period.
21-25	NTEMP(5)	1	Read new nonpoint source inflow data.
		0	Omit Card Type 21. Use nonpoint source data from previous hydrologic period.
26-30	NTEMP(6)	1	Read new hourly inflow data
		0	Omit Card Type 22. Use data from previous hydrologic period.
31-35	NTEMP(7)	1	Read new Manning's roughness coefficients for selected channels
		0	Omit Card Type 23. Use coefficients from previous hydrologic period.

Card Type 17a - Tide Data, Tidal Extremes (2 cards, optional)

The six sequential time and stage pairs must include three high and three low tidal stages. The first pair is normally on or before hour zero and the last is normally after hour PERIOD (Card 12). Omit if NTEMP(1) (Card 16) is zero and JEX (Card 12) is negative.

Field	Variable	Value	Description
1-10	TT(1)	+	Time and stage pairs defining the highs and lows of the tidal cycle.
11-20	YY(1)	+	
21-30	TT(2)	+	
31-40	YY(2)	+	
41-50	TT(3)	+	
51-60	YY(3)	+	

Card Type 17b - Tide Data, 15 minute intervals (variable number of cards, optional)

Tidal stage elevations at 15 minute intervals are required with this option. These data include one value 15 minutes before time zero and one value 15 minutes after hour 24 or 25 (i.e., values = NR = 4*hours+2). At the user option, the tide for the entire simulation period may be input with the first set of boundary conditions. These data are written on file 67 and will be rewound and reused if an end of file is encountered. Omit if NTEMP(1) (Card 16) is zero and JEX (Card 12) is positive.

Field	Variable	Value	Description
Free	H(1)	+	Tidal stage in feet at 15 minute
Field	H(2)	+	intervals. A slash (/) is required
Input	.		following the final tidal elevation.
.	.		
	H(NR)	+	

Card Type 18 - Evaporation Data (optional)

The evaporation data should include precipitation (i.e., negative evaporation) and are defined by zones. Evaporation and precipitation should be set to zero if they have been included in the channel depletion data (Card 20). Omit if NTEMP(2) (Card 16) is zero. A maximum of 20 evaporation zones are allowed, signal the end with a zero in field 1-5.

Field	Variable	Value	Description
1-5	J1	+	Node defining the beginning of the evaporation zone.
		0	End of evaporation data.
6-10	J2	+	Node defining the end of the evaporation zone.
11-20	EVAP0	+	Evaporation rate, inches/month

Card Type 19 - Wind Data (optional)

Hourly values for wind speed and direction may be entered for a maximum of 5 zones. Keep in mind that x and y coordinates (Card Type 13) are required if wind effects are to be simulated. Each wind zone requires one 19a card and three 19b cards. Omit if NTEMP(3) (Card 16) is zero. Signal end of wind data with zero in field 1-5.

Card 19a

Field	Variable	Value	Description
1-5	J1	+	First channel of a wind zone
		0	End of wind data.
6-10	J2		Last channel of a wind zone
11-15	WIND(1)	+	Wind speed (mph) and direction wind is blowing from at hour one (degrees clockwise from Y-axis).
16-20	WDIR(1)	+	

Card 19b (3 cards)

Field	Variable	Value	Description
1-5	WIND(2)	+	Wind speed and direction pairs for re-
6-10	WDIR(2)	+	maining 25 hours.
11-15	WIND(3)	+	
.	.	.	
71-75	WIND(25)	+	
76-80	WDIR(25)	+	

Card Type 20 - Channel Depletion and Point Inflows and Withdrawals (optional)

Channel depletion ratios are specific to the Stockton ship channel project network. The lowlands and highlands depletion ratios for 111 Delta nodes are input by Card Type 20a. The channel depletion ratios are read on the first pass only. These data developed by the State of California Department of Water Resources represent the distribution of evaporation and net agricultural consumption within the Delta. The total channel depletion is input on Card 20a. Sixty-one percent of the total is distributed to the lowlands and 39% to the highlands and intern distributed to the 111 nodes by these channel depletion ratios. Channel depletion data are read only if NTEMP(4) (Card 16) is 2.

Other point inflow and withdrawals are input if NTEMP(4) is greater than zero. the end of the data is signaled by a zero in field 1-5 of Card 20c.

Card 20a (111 cards)

Enter these data only for the first time NTEMP(4) (Card 16) is 2. They are then held constant for remainder of the simulation period.

Field	Variable	Value	Description
1-20	NODE	+	Node number
11-20	UFL(1)	+	Upland and lowland channel depletion
21-30	UFL(2)	+	ratios

Card 20b (1 card)

Omit this card if NTEMP(4) (Card 16) is less than 2.

Field	Variable	Value	Description
1-10	QLOW	+	Total Delta channel depletion, cfs.

Card 20c

Omit if NTEMP(4) is zero.

Field	Variable	Value	Description
1-5	N	+	Node number
		0	End of inflow and withdrawal data
6-15	QQIN	+	Inflow to node, cfs
16-25	QQOU	+	Withdrawal from node, cfs

Card Type 21 - Nonpoint Inflow or Withdrawal Rates (optional)

These data are designed to represent ill-defined inflow such as net ground water infiltration and are in addition to those inflow data input by card types 20 and 22. Signal end of data by zero in field 1-5. Omit if NTEMP(5) is zero.

Field	Variable	Value	Description
1-5	J1	+	First node for which nonpoint inflow rate applies
		0	End of nonpoint inflow data
6-10	J2	+	Last node for which nonpoint inflow rate applies

11-15 GROUND + Net nonpoint inflow rate, cfs

Card Type 22 - Hourly Inflow Rates (optional)

These data are designed to represent transient inflows such as storm discharge and are in addition to those inflow data input by Card Types 20 and 21. Forty hourly inflows may be specified, signal end of data with zero in field 1-5 (Card 22). Omit if NTEMP(6) is zero.

Card 22a

Field	Variable	Value	Description
1-5	N	+	Node number
		0	End of hourly inflow data
6-10	TN(1)	+	Average hourly inflows (cfs) for
11-15	TN(2)	+	first 12 hours
.	.	.	.
61-65	TN(12)	+	

Card 22b

Field	Variable	Value	Description
1-5	TN(13)	+	Average hourly inflows (cfs) for the
6-10	TN(14)	+	remaining 13 hours
.	.	.	.
61-65	TN(25)	+	

Card Type 23 - Mannings Coefficient Update (optional)

The Mannings coefficient may be revised as the simulation progresses to reflect changes in the hydraulics characteristics of the system. An example of the use of this option is the simulation of the barrier placed in Old River at the San Joaquin split. Omit if NTEMP(7) (Card 16) is zero, signal end of data with a zero in field 1-5 (Card 23)

Field	Variable	Value	Description
1-5	N	+	Channel number
		0	End of Mannings coefficient update
6-15	COEF	+	Mannings coefficient

Card Type 24 - Plot Control (optional, see Card 1a)

Plots specified by Card Types 24, 25 and 26, require velocity, flow and stage results contained on files 7, 8 and 9 respectively.

Field	Variable	Value	Description
1-5	IPC	1	Plot computed and observed stage at one location.
		2	Plot computed versus observed stage at one location and determine the statistical relationship between the computed and observed data.
		3	Plot stage at up to three locations on one plot.
		4	Plot flow or velocity at up to three locations on one plot.
		END	No more plots, read title (Card 1) for next job.
6-10	IND(1)	+	Up to three nodes or channels
11-15	IND(2)	+	specified for plotting (only IND(1) is
16-20	IND(3)	+	used if IPC = 1 or 2).
21-25	XLF	+	Scaling factor of the horizontal plot dimension.

Card Type 25 - Gage Identification and Datum (required if IPC, Card 24, is 1 or 2)

Field	Variable	Value	Description
1-8	GAGE	Alpha	Eight character description to be included with the plot identification.
9-16	YYC	+	Value by which all observed stages input on Card 26 will be correction (e.g., correct for datums other than mean sea level).

Card Type 26 - Observed Stage Data (required if IPC, Card 24 is 1 or 2)

Field	Variable	Value	Description
Free Field Input	TS1(1) TS2(1) .	+	Time and stage pairs of observed data. Up to 500 pairs may be specified. Repeat cards as necessary. A slash (/) is required following the final observation.
.	.	.	
	TS2(N)	+	

Card Type 27 - End of Record Card (required)

Field	Variable	Value	Description
1-2	IE	ER	The "ER" will signal the end of the data set for the current job. This card is required if multiple jobs are stacked one after the other. This card allows any unused cards to be skipped before beginning the next job.

IV.2 WATER QUALITY MODEL DATA REQUIREMENTS

The input requirements for the water quality model described below fall into the general categories of:

- Control specifications for computational options and output formats;
- Initial quality at the seaward boundary;
- Water quality at the seaward boundary;
- Water quality of the point and non-point sources;
- Chemical, physical and biological coefficients;
- Meteorological and climatological conditions;
- Plot controls and observed data for plotting.

Card Type 1 - Job Headings (two required)

These headings describing the simulation will be printed at appropriate locations within the output. The second heading will be updated when boundary conditions are specified (see Card Type 9).

Field	Variable	Value	Description
1-80	TITLE	alpha	Main heading
1-80	TITL	alpha	Sub heading

Card Type 1a - Simulation/Plot Selection (required)

This card is used to select simulation and/or high resolution incremental plotting. The high resolution plots require a plot interface file containing concentrations at all the nodes. This file may be generated during the current simulation run (file IPLT, card 2), or may have been stored from a previous run.

Field	Variable	Value	Description
1-5	NWQ		Water quality simulation option control.
		0	No water quality simulation. Omit Card Types 3 through 14.
		1	Perform water quality simulation.

6-10	NPLT	Optional high resolution plots of average daily quality as time series or profile plot, daily maxima and minima as time series or profile plot, and average daily quality under different conditions (2 interface files required). This option does not affect printer plots specified within water quality simulation data set.
0		No high resolution plots. Omit cards 15 through 25d.
1		Process high resolution plots.

Card Type 2 - Simulation and Input/Output Controls (required)

These controls define the length of simulation and the type and quantity of output. If NWQ=0 (Card 1a), only variable IPLT need be specified (field 66-70).

Field	Variable	Value	Description
1-5	IDAY	+	Julian date corresponding to the first day of simulation.
6-10	NHCON	+	Number of hydrodynamic boundary conditions (maximum of 52).
11-15	NCOND	+	Number of sets of water quality boundary conditions (maximum of 52).
16-20	HQH	+	Length of water quality time step in hours (usually 1 hour).
20-25	NTYPE	1 2 4	Type of numerical integration ordinary extrapolation two step modified Euler four step Runge-Kutta
26-30	NHYD	+	Quality time steps per day (usually 24)
31-35	NHOUR	+	Hour of the hydrodynamic output corresponding to the beginning of the quality simulation.
36-40	NJP	+	Number of nodes for time series plots (maximum of 6).
0			No time history plots, omit card type 6.

41-45	NPP	+	Number of profile plots (maximum of 2).
		0	No profile plots, omit card types 7a & 7b
46-50	INHYD	+	Interface file containing the hydrodynamic model simulation results.
51-55	INQUAL	+	Initial condition file generated by the tidally averaged water quality model.
		0	Initial condition will be read from type 8 cards.
56-60	ISCR	+	File unit number. The hydrodynamic output contained on file INHYD is processed and flow data at hourly intervals for the entire simulation period are stored on this file.
		-	File unit containing processed hydrodynamic data generated in a previous quality run.
		0	Hydrodynamic data will be read from INHYD directly. This option cannot be used if average hydrodynamic output is being used for more than one day of quality simulation.
61-65	ISCR1	+	Scratch file unit required if ISCR is greater than zero.
		0	ISCR is zero or negative.
66-70	IPLT	+	File unit for storing quality results for input to high resolution plot routines. Must be 0 if NPLT (Card 1a)=1, or if plotting is anticipated at a later time.
		0	No high resolution plots are anticipated.
71-75	IOMET	+	Output file containing meteorological data.
		0	Meteorological data will not be printed.
76-80	IODIAG	+	Output file containing diagnostic printout. Information contained on this file may be helpful in diagnosing simulation problems.
		0	Diagnostics will not be printed.

Card Type 3 - Quality Boundary Condition Control (required if NWA=1)

Field	Variable	Value	Description
1-5	NQPERH(1)	+	Number of days of simulation for each set
6-10	NQPERH(2)	+	of boundary conditions. Repeat as necessary to specify NCOND (Card 2) values.
.	NQPERH(NCOND)	+	
76-80			

Card Type 4 - Hydrodynamic Boundary Condition Control (required if NWQ=1)

Field	Variable	Value	Description
1-5	NHPER(1)	+	Number of tidal days for each hydrodynamic condition. Repeat as necessary to specify NHCON (Card 2) values.
6-10	NHPER(2)	+	
.	NHPER(NHCON)	+	
76-80			

Card Type 5 - Tidal Boundary Nodes (required if NWQ=1)

Field	Variable	Value	Description
1-5	NBOUND	+	Number of seaward boundary nodes (maximum of 10).
6-10	JBOUND(1)	+	Node numbers at the seaward boundary
11-15	JBOUND(2)	+	(NBOUND values required).
.	JBOUND(NBOUND)	+	
61-65			

Card Type 6 - Time Series Plot Control (optional)

Time series printed plots of the simulation results may be specified using the following parameter codes:

1. Total dissolved solids
2. Nitrate nitrogen
3. Phosphate phosphorus
4. Total coliform bacteria
5. Organic detritus
6. Carbonaceous BOD
7. Ammonia nitrogen
8. Dissolved oxygen
9. Temperature

10. Algae 1 (usually diatom)
 11. Algae 2 (greens or other significant types)

Time series printer plots may be specified for up to 4 parameters at up to 6 nodes. A single parameter will be plotted at three nodes on a single page (e.g., three parameters at 6 nodes will produce 6 plots). Omit card if NJP (Card 2) is zero.

Field	Variable	Value	Description
1-5	IPLLOT(1)	+	Parameter codes for time series printer plots.
6-10	IPLLOT(2)	+	
11-15	IPLLOT(3)	+	
16-20	IPLLOT(4)	+	
21-25	JPLLOT(1)	+	Nodes for time series plots
26-30	JPLLOT(2)	+	
.	JPLLOT(NJP)	+	
46-50			

Card Type 7a - Concentration Profile Plot Control (optional)

Concentration profile printer plots of the final day of simulation may be specified using the parameter codes specified for card type 6. One parameter at three hours is plotted on each page. Omit card types 7a and 7b if NPP (Card 2) is zero. Two sets of 7a and 7b cards are required if NPP equal 2.

Field	Variable	Value	Description
1-5	NCONP(1)	+	Parameter codes for concentration profile printer plots.
6-10	NCONP(2)	+	
11-15	NCONP(3)	+	
16-20	NCONP(4)	+	
21-25	IPDAY(1)	+	Hours for concentration profiles.
26-30	IPDAY(2)	+	
31-35	IPDAY(3)	+	

Card Type 7b (optional - 2 cards required if NPP, card 2 is positive)

Field	Variable	Value	Description
1-5	NODEP(1,NPP)	+	Nodes for concentration profile.
6-10	NODEP(2,NPP)	+	
.	.	.	
21-25	NODEP(21,NPP)	+	
(second card)			

Card Type 8 - Initial Conditions (required if NWQ=1)

Initial conditions should be defined for each node and may be defined on a node by node basis or by zones (i.e., J1 & J2). Repeat as necessary and terminate with a zero in field 1-5.

Field	Variable	Value	Description
1-5	J1	0	End of initial condition data.
		+	First node for which data apply.
6-10	J2	+	Last node for which data apply.
11-15	ALL(1)	+	Total dissolved solids, mg/l
16-20	ALL(5)	+	Nitrate nitrogen, mg/l
21-25	ALL(6)	+	Phosphate phosphorus, mg/l
26-30	ALL(2)	+	Total coliforms, mg/l
31-35	ALL(3)	+	Organic detritus, mg/l
36-40	ALL(7)	+	Ultimate carbonaceous BOD, mg/l
41-45	ALL(8)	+	Ammonia nitrogen, mg/l
46-50	ALL(9)	+	Dissolved oxygen, mg/l
51-55	ALL(4)	+	Temperature, degrees celsius
56-60	ALL(10)	+	Algae 1, mg/l
61-68	ALL(11)	+	Algae 2, mg/l

Card Type 9 - Printout Subheading (required if NWQ=1)

This subheading replaces the title read from the second Card Type 1 and will be printed with the following set of quality boundary conditions (Cards 10 through 14).

Field	Variable	Value	Description
1-80	TITL	alpha	Subheading

Card Type 10 - Water Quality Input Controls (required if NWQ=1)

The water quality input controls specify which boundary condition data are to be read. All boundary conditions are set to zero until data inputs are specified here and read from Cards 11 through 14. Once these data are read, they remain in effect until they are respecified for subsequent quality periods.

Field	Variable	Value	Description
1-15			Not used.

16-20	NTEMP(4)	1	Read new tidal boundary quality conditions.
		0	Use tidal quality from previous period, omit Card Type 11.
21-25	NTEMP(5)	1	Read new inflow quality conditions.
		0	Use inflow quality from previous period, omit Card Type 12.
26-40			Not used.
41-45	NTEMP(9)	1	Read new system coefficients.
		0	Use quality coefficients from previous period. Omit Card Type 13.
46-50			Not used.
51-55	NTEMP(11)	+	Printed output interval and external plot file (Unit IPLT, Card 2) output interval, days.
56-60	NTEMP(12)	+	External plot file output interval, hours
61-65	NTEMP(13)	+	Printed output interval, hours.

Card Type 11 - Tidal Boundary Quality Specification (optional)

The hourly quality at the boundary nodes is computed by interpolation from these data. Hours 1 and 25 are required and correspond to midnight of successive days. Other hours are optional. Omit these cards if NTEMP(4) (Card Type 10) is zero.

Field	Variable	Value	Description
1-5			Not used.
6-10	J2	+	Beginning of the hour for which the data apply (the first hour must be 1 and the final hour must be 25).
11-15	ALL(1)	+	Total dissolved solids, mg/l
16-20	ALL(5)	+	Nitrate nitrogen, mg/l
21-25	ALL(6)	+	Phosphate phosphorus, mg/l
26-30	ALL(2)	+	Total coliforms, mg/l
31-35	ALL(3)	+	Organic detritus, mg/l
36-40	ALL(7)	+	Ultimate carbonaceous BOD, mg/l
41-45	ALL(8)	+	Ammonia nitrogen, mg/l
46-50	ALL(9)	+	Dissolved oxygen, mg/l
51-55	ALL(4)	+	Temperature, degrees celsius

56-60	ALL(10)	+	Algae 1, mg/l
61-65	ALL(11)	+	Algae 2, mg/l

Card Type 12 - Inflow Quality Specifications (optional)

A maximum of 200 inflow may be specified to 100 different nodes. When more than one inflow is specified at a single node, the flows are aggregated on a flow weighted basis. Signal the end of these data with a zero in field 1-5. Omit these cards if NTEMP(5) (Card Type 10) is zero.

Field	Variable	Value	Description
1-5	J1	0	End of inflow quality data.
		+	Node number.
6-10	QQ	0	Inflow specified in the hydrodynamic simulation will be used.
		+	Inflow rate, cfs.
11-15	ALL(1)	+	Total dissolved solids, mg/l
16-20	ALL(5)	+	Nitrate nitrogen, mg/l
21-25	ALL(6)	+	Phosphate phosphorus, mg/l
26-30	ALL(2)	+	Total coliforms, mg/l
31-35	ALL(3)	+	Organic detritus, mg/l
36-40	ALL(7)	+	Ultimate carbonaceous BOD, mg/l
41-45	ALL(8)	+	Ammonia nitrogen, mg/l
46-50	ALL(9)	+	Dissolved oxygen, mg/l
51-55	ALL(4)	+	Temperature, degrees celsius
56-60	ALL(10)	+	Algae 1, mg/l
61-65	ALL(11)	+	Algae 2, mg/l

Card Type 13 - System Coefficients (optional)

System coefficients must be defined for each node and may be defined on a node by node basis or by zones. Repeat as necessary and terminate with a zero in field 1-5. Omit these cards if NTEMP(9) (Card Type 10) is zero.

Field	Variable	Value	Description
1-5	J1	0	End of system coefficient data.
		+	First node for which data apply.
6-10	J2	+	Last node for which data apply.

11-15	ALL(1)	+	Depth of 1% light penetration due to background turbidity. For the Stockton model, background turbidity is defined as the actual less the effects of detritus and phytoplankton.
16-20	ALL(2)	+	Benthic nitrogen source rate, mg/m ² /day (a positive value contributes to ammonia pool).
21-25	ALL(3)	+	Benthic phosphorus source rate, mg/m ² /day (a positive value contributes to the phosphate pool).
26-30	ALL(4)	+	Benthic oxygen sink rate, mg/m ² /day (a positive value removes dissolved oxygen).
31-35	ALL(5)	+	Maximum allowable reaeration rate*, 1/day
36-40	ALL(6)	+	Minimum allowable reaeration rate*, 1/day
41-45	ALL(7)	+	Oxygen source rate by forced aeration in pounds/mile of channel.
46-50	ALL(8)	+	Oxygen source rate by forced aeration in pounds/million square feet.
51-55	ALL(9)	+	Oxygen source rate by forced aeration in pounds/node.

* The reaeration rate is computed for each node as a function of flow rate and depth and as a function of wind speed. The maximum of the values computed by the two methods is selected and constrained by the allowable maximum and minimum.

NOTE: In addition to the coefficients entered on the type 13 card, the model requires 31 additional physical, chemical and biological coefficients. These coefficients are defined in the BLOCK DATA of the quality model. The coefficients of the calibrated model and the normal range of values reported in the literature (3, 4 and 5) are shown in Table IV-1.

Card Type 14 - Meteorologic Data (required if NWQ=1)

Meteorological data are input at hourly intervals for the period specified by NQPERH (Card Type 3) and should represent average condition during the hour.

Field	Variable	Value	Description
1-5	NN	+	Hour of the day.

TABLE IV-1
CHEMICAL, PHYSICAL AND BIOLOGICAL COEFFICIENTS

COEFFICIENT	TYPICAL RANGE	CALIBRATED VALUE
Nitrogen fraction of phytoplankton	.02-.09	0.080
Phosphorus fraction of phytoplankton	.005-.012	0.012
Nitrogen fraction of detritus	.02-.09	0.080
Phosphorus fraction of detritus	.002-.012	0.012
Settling rate for Algae 1, M/day	0-2	0.500
Settling rate for Algae 2, M/day	0-1	0.150
Detritus settling rate, M/day	0-2	0.250
BOD decay rate, 1/day	.1-.3	0.200
Detritus decay rate, 1/day	.001-.05	0.040
Ammonia decay rate, 1/day	.04-.2	0.100
Coliform die off rate, 1/day	.5-3.	1.000
Temperature adjustment for BOD decay	1.03-1.06	1.047
Temperature adjustment for ammonia decay	1.02-1.03	1.022
Temperature adjustment for coliform die off	1.03-1.06	1.040
Temperature adjustment for detritus decay	1.02-1.04	1.025
Ratio of oxygen uptake to ammonia decay	4.6	4.600
Ratio of oxygen uptake to detritus decay	1.2-2.0	1.600
Ratio of oxygen production to phytoplankton photosynthesis	1.6	1.600
Ratio of oxygen uptake to phytoplankton respiration	1.6	1.600
Light extinction coefficient for detritus	.01-.25	0.200
Light extinction coefficient for phytoplankton	.15-.25	0.200
Maximum growth rate for Algae 1, 1/day	1.-3.	2.000
Maximum growth rate for Algae 2, 1/day	1.-4.	2.500
Respiration rate for Algae 1, 1/day	.05-.3	0.200
Respiration rate for Algae 2, 1/day	.05-.3	0.250
Light half saturation for Algae 1 growth, kcal/m ² /sec	.002-.004	0.002
Light half saturation for Algae 2 growth, kcal/m ² /sec	.003-.006	0.006
Nitrogen half saturation for Algae 1 growth, mg/l	.03-.10	0.050
Nitrogen half saturation for Algae 2 growth, mg/l	.05-.20	0.200
Phosphorus half saturation for Algae 1 growth, mg/l	.02-.05	0.020
Phosphorus half saturation for Algae 2 growth, mg/l	.03-.06	0.050

6-10	ALL(1)	+	Cloud cover, fraction.
11-15	ALL(2)	+	Dry bulb temperature, degrees celsius.
16-20	ALL(3)	+	Dew point temperature, degrees celsius.
21-25	ALL(4)	+	Wind speed, meters/sec.
26-30	ALL(5)	+	Atmospheric pressure, millibars.
39-40	IDAT(1)	+	Year or blank
44-45	IDAT(2)	+	Month or blank.
49-50	IDAT(3)	+	Day or blank.

Card Type 15 - High Resolution Plot Option Control (required if NPLT=1)

This card controls which type of high resolution plots will be generated. A plot interface file containing concentration data must have been specified (IPLT, card type 2). This file may be generated during the current simulation run, or during a previous simulation run. Any number of plots may be specified, signal the end of the plot job by zeros in all 3 fields.

Field	Variable	Value	Description
1-5	IOPT1		Controls average quality plots. These plots are useful for comparing concentration time series at several nodes, or concentration profiles at several different day/hour.
		0	No average quality plots. Omit Cards 16 through 18.
		1	Process average quality plots (Option 1 plots).
6-10	IOPT2		Controls daily maxima and minima plots. These plots are useful for visualizing daily maxima and minima at a node over the simulation period, or comparing maxima and minima on a given day at each node along the river profile.
		0	No maxima and minima plots. Omit Cards 19 through 21.
		1	Process maxima and minima plots (Option 2 plots).

11-15	IOP3	Controls sensitivity analysis plots. These plots are useful for comparing time series at a node under different conditions, or the concentration profile at a given day/hour under different conditions.
	0	No sensitivity comparison plots. Omit Cards 22 through 25.
	1	Process sensitivity comparison plots (Option 3 plots).

Card Type 16 - Option 1 Plot Control (required if NPLT=1 and IOP3=1)

This card controls whether a time series or a profile plot will be drawn. Repeat Cards 16 through 18 as required to produce desired Option 1 plots. Indicate end of Option 1 plots with I1=999 on this card.

Field	Variable	Value	Description
1-5	I1		Time series or profile plot control.
		1	Time series. Supply Cards 17a through 17b.
		2	Profile plot. Supply Cards 18a through 18d.
		999	End of Option 1 type plots.

Card Type 17a - Option 1 Time Series Control (optional)

This card specifies the constituent identification code (see definitions Card 6), and up to 3 nodes to be compared on one time series plot.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (as in Card 6)
6-10	NODE(1)	+	< 3 nodes to be plotted together on the
11-15	NODE(2)	+	same time series plot.
16-20	NODE(3)	+	

Card Type 17b - Option 1 Time Series Control (optional)

This card allows the user to specify day and hour to start plot, and day and hour to finish plot. A portion of the simulation period may be magnified by specifying a shorter time series. These values must correspond to a portion of the simulation period specified in Card 2.

Field	Variable	Value	Description
1-5	MINDAY	+	Julian day corresponding to start of time series plot.
6-10	MINHR	+	Hour corresponding to start of time series plot.
11-15	MAXDAY	+	Julian day corresponding to end of time series plot.
16-20	MAXHR	+	Hour corresponding to end of time series plot.

Card 18a - Option 1 Profile Plot Control (optional)

This card specifies the constituent identification code (see definitions Card 6), and up to 3 day/hour times to be compared on one profile plot.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (as in Card 6)
6-10	IDYHR(1,1)	+	Day of first profile to be plotted.
11-15	IDYHR(2,1)	+	Hour of first profile to be plotted.
16-20	IDYHR(1,2)	+	Day of second profile to be plotted.
21-25	IDYHR(2,2)	+	Hour of second profile to be plotted.
26-30	IDYHR(1,3)	+	Day of third profile to be plotted.
31-35	IDYHR(2,3)	+	Hour of third profile to be plotted.

Card 18b - Option 1 Profile Plot Control (optional)

The river profile to be used must be specified. With many networks, multiple paths through the network are possible. The profile to be used is specified as a series of consecutive channels, entered from most downstream segment to most upstream segment.

Field	Variable	Value	Description
1-5	NPCHAN	+	Number of channel segments in the desired river profile.

6-10	IPCHAN(1)	+	NPCHAN values (≤ 166) indicating the channel numbers of consecutive segments in the river profile.
11-15	IPCHAN(2)	+	
.	.	.	
.	.	.	
.	.	.	
76-80	IPCHAN(31)	+	

Card Type 18c - Option 1 Profile Plot Control (optional)

This card specifies whether observed water quality data will be plotted with the calculated river profile. These data are entered as river mile/max observation/min observation records.

Field	Variable	Value	Description
1-5	ITS	+	Number of data observation records. ITS ≤ 100 .
		0	No data will be plotted.
6-10	XX1	+	River mile location of the first point in the profile plot (i.e., downstream node of channel IPCHAN(1), Card 18b).

Card Type 18d - Option 1 Profile Plot Control (optional)

This card will be repeated ITS times. It contains observed concentration values of the constituent specified in Card 18a.

Field	Variable	Value	Description
1-10	TS(1,i)	+	River mile where ith observations were made. Referenced to the D/S node of the first channel (i.e., IPCHAN(1), Card 18b)
11-20	TS(2,i)	+	Minimum of observed values at river mile TS(1,i).
21-30	TS(3,i)	+	Maximum of observed values at river mile TS(1,i).

Card Type 19 - Option 2 Plot Control (required if NPLT=1 and IOPT=2)

This card controls whether a time series or a profile plot will be drawn. Repeat Cards 19 through 21 as required to produce desired Option 2 plots. Indicate end of Option 2 plots with I1=999 on this card.

Field	Variable	Value	Description
1-5	I1		Time series or profile plot control.
		1	Time series. Supply Cards 20a through 20b.
		2	Profile plot. Supply Cards 21a through 21d.
		999	End of Option 2 plots.

Card Type 20a - Option 2 Time Series Control (optional)

This card specifies the constituent identification code (see Card 6) and the node where maxima and minima over the simulation period will be plotted in series.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (as in Card 6)
6-10	NODE(1)	+	Node where time series of daily maxima and minima will be plotted.

Card Type 20b - Option 2 Time Series Control (optional)

This card allows the user to specify the beginning and ending day of the time series plot. Values for time steps outside of the specified interval will not be considered when locating maxima and minima. These values must correspond to a portion of the simulation period specified in Card 2.

Field	Variable	Value	Description
1-5	MINDAY	+	Julian day corresponding to start of time series plot.
6-10	MAXDAY	+	Day corresponding to end of time series plot.

Card Type 21a - Option 2 Profile Plot Control (optional)

This card specifies the constituent identificaton code (see Card 6), and the day when maxima and minima at each node on the river profile will be plotted.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (see Card 6)
1-6	IDYHR(1,1)	+	Day of maxima and minima profile plot.

Card Type 21b - Option 2 Profile Plot Control (optional)

The river profile to be used must be specified. With many networks, multiple paths through the network are possible. The profile to be used is specified as a series of consecutive channels, entered from most downstream to most upstream segment.

Field	Variable	Value	Description
1-5	NPCHAN	+	Number of channel segments in the desired river profile.
6-10	IPCHAN(1)	+	NPCHAN values (< 166) indicating the channel numbers of consecutive segments in the river profile.
11-15	IPCHAN(2)	+	
.	.	.	
.	.	.	
.	.	.	
76-80	IPCHAN(15)	+	

(2nd Card - repeat as required for NPCHAN values)

1-5	IPCHAN(16)	+
.	.	.
.	.	.
.	.	.
76-80	IPCHAN(31)	+

Card Type 21c - Option 2 Profile Plot Control (optional)

This card specifies whether observed water quality data will be plotted with the calculated maxima and minima profile. These data are entered as river mile/max observation/min observation records.

Field	Variable	Value	Description
1-5	ITS	+	Number of data observation records. ITS \leq 100.
		0	No data will be plotted.

Card Type 21d - Option 2 Profile Plot Control (optional)

This card will be repeated ITS times. It contains observed concentration values of the constituent specified in Card 21a.

Field	Variable	Value	Description
1-10	TS(1,i)	+	River mile where ith observations were made.
11-20	TS(2,i)	+	Minimum of observed values at river mile TS(1,i)
21-30	TS(3,i)	+	Maximum of observed values at river mile TS(1,i)

Card Type 22 - Option 3 File Unit for Sensitivity Analysis (required if NPLT=1 and IOPT=3)

This card specifies the file unit where concentration data from a previous run have been stored. Optionally, 2 file units may be specified if comparison is to be made between two previously stored runs. Otherwise, the file unit from the current water quality simulation (IPLT, Card 2) will be compared with data from a previous simulation (IPLT2, below).

Field	Variable	Value	Description
1-5	IPLT1	0	Use file unit specified as "IPLT" on Card 2.
		+	File unit where results from a previous simulation run are stored.
1-6	IPLT2	+	File unit where results from a previous simulation run are stored.

Card Type 23 - Option 3 Plot Control (required if NPLT=1 and IOPT=3)

This card controls whether a time series or a profile plot will be drawn. Repeat cards 22 through 24 as required to produce desired Option 3 plots. Indicate end of Option 3 plots with II=999 on this card.

Field	Variable	Value	Description
1-5	II		Time series or profile plot control.
		1	Time series. Supply cards 24a through 24b.

2 Profile plot. Supply cards 25a through 25d.
999 End of Option 3 plots.

Card Type 24a - Option 3 Time Series Control (optional)

This card specifies the constituent identification code (see Card 6) and the node where concentrations from the two simulation runs will be plotted as a time series.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (see Card 6)
6-10	NODE(1)	+	Node where time series from two different simulations will be plotted.

Card Type 24b - Option 3 Time Series Control (optional)

This card allows the user to specify day and hour to start plot, and day and hour to finish plot. These values must correspond to a portion of the simulation period specified in Card 2.

Field	Variable	Value	Description
1-5	MINDAY	+	Julian day corresponding to start of time series plot.
6-10	MINHR	+	Hour corresponding to start of time series plot.
11-15	MAXDAY	+	Julian day corresponding to end of time series plot.
16-20	MAXHR	+	Hour corresponding to end of time series plot.

Card Type 25a - Option 3 Profile Plot Control (optional)

This card specifies the constituent identification code (see Card 6), and the day/hour when concentrations at each node on the river profile will be plotted.

Field	Variable	Value	Description
1-5	ID	+	Constituent ID (see Card 6)
6-10	IDYHR(1,1)	+	Day of comparison profile plot.

11-15 IDYHR(2,1) + Hour of comparison profile plot.

Card type 25b - Option 3 Profile Plot Control (optional)

The river profile to be used must be specified. With many networks, multiple paths through the network are possible. The profile to be used is specified as a series of consecutive channels, entered from most downstream to most upstream segment.

Field	Variable	Value	Description
1-5	NPCHAN	+	Number of channel segments in the desired river profile.
6-10	NPCHAN(1)	+	
11-15	IPCHAN(2)	+	NPCHAN values (< 166) indicating the channel numbers of consecutive segments in the river profile.
.	.	.	
.	.	.	
.	.	.	
76-80	IPCHAN(15)	+	

(2nd Card - repeat as required for NPCHAN values)

1-5	IPCHAN(16)	+
.	.	.
.	.	.
.	.	.
76-80	IPCHAN(31)	+

Card Type 25c - Option 3 Profile Plot Control (optional)

This card specifies whether observed water quality data will be plotted with the calculated profiles from the two water quality simulations. These data are entered as river mile/max observation/min observation records.

Field	Variable	Value	Description
1-5	ITS	+	Number of data observation records. ITS \leq 100.
		0	No data will be plotted.

Card Type 25d - Option 3 Profile Plot Control (optional)

This card will be repeated ITS times. It contains observed concentration values of the constituent specified in Card 25a.

Field	Variable	Value	Description
1-10	TS(1,i)	+	River mile where ith observations were made.
11-20	TS(2,i)	+	Minimum of observed values at river mile TS(1,i)
21-30	TS(3,i)	+	Maximum of observed values at river mile TS(1,i)

Card Type 26 - End of Record Card (required)

Field	Variable	Value	Description
1-2	IE	ER	The "ER" will signal the end of the data set for the current job. This card is required if multiple jobs are stacked one after the other. This card allows any unused cards to be skipped before beginning the next job.

V. MODEL RESULTS

V.1 HYDRODYNAMIC MODEL OUTPUT

The hydrodynamic model can be operated in either the computation mode or the high resolution plot mode. In the computational mode, the model output provides a comprehensive summary of input conditions and simulation results. The major components of the output are:

- Simulation controls.
- Channel and node geometry.
- Tidal stage at the seaward boundary, evaporation rates, inflows, channel depletions and other withdrawals, wind conditions and adjustments in Mannings "n" for each set of hydraulic conditions.
- Hourly stages at selected nodes.
- Hourly flows and velocities in selected channels.
- Average, maximum and minimum heads, water balance, and volume for each node.
- Average, maximum and minimum velocity and flow and maximum hydraulic gradient in each channel.

In addition to this tabular summary, the following printer plot options are available:

- Tidal range versus location.
- Time of high water versus location.
- Velocity versus time in selected channels.
- Stage versus time at selected nodes.

To supplement this printer output, three output files may be written containing water surface elevation at selected nodes and flow and velocity in selected channels.

In the high resolution plot mode, these files are read and any of the following plots can be produced.

- Time series of computed and observed water surface elevation at a node
- Computed versus observed water surface elevation at a node

- Time series of water surface elevation at up to 3 nodes
- Time series of velocity or flow in up to 3 channels

These plot options use standard CALCOMP plot routines and require a high resolution digital plotter.

Associated with the second plot option is a statistical analysis of variations between the computed and observed data.

Diagnostic Error Messages

In addition to the normal output summarized above, there are several diagnostic and error messages which describe possible problems with the input data or numerical problems encountered during the simulation.

If errors occur in the node and channel inputs, the runstream will terminate and one or more of the following messages will be printed:

JUNCTION NUMBER IS LARGER THAN PROGRAM DIMENSIONS. (Node numbers must not be greater than 300.)

CHANNEL NUMBER IS LARGER THAN PROGRAM DIMENSIONS. (Channel numbers must not be greater than 400.)

CHANNEL CARD COMPATIBILITY CHECK, CHANNEL AND JUNCTION . (Channel-node interconnectivity is erroneous.)

JUNCTION CARD COMPATIBILITY CHECK, JUNCTION AND CHANNEL . (Node-channel interconnectivity is erroneous.)

In addition to these input data error messages, the following warnings may be printed with the channel and node geometry data summary.

NOTE -- * INDICATES NEGATIVE WIDTH IS POSSIBLE WITH ANTICIPATED TIDAL STAGE.

* INDICATES CHANNEL MAY DRAIN ADJOINING NODE AT ANTICIPATED TIDAL STAGE.

** INDICATES NEGATIVE VOLUME IS POSSIBLE WITH ANTICIPATED TIDAL STAGE.

These messages are printed if the maximum anticipated tidal stage departure from mean tide level is large enough to cause the indicated problem. No remedial action is required unless the simulation terminates due to these conditions later.

The next possible error will occur only if output for the tidally averaged quality model (AQUAL) is specified.

The dimension limits in AQUAL will be exceeded if either of the half band widths of the equation matrix are greater than twenty (20). In this case the runstream is terminated and the following error message is printed:

THE HALF BAND WIDTH OF _____ FOR EQUATION NUMBER _____, NODE
_____ EXCEEDS THE DIMENSION LIMITS IN PROGRAM AQUAL.

If this message appears, one of the following actions is required:

- Redimension AQUAL.
- Select a different node which is located at some extreme of the network to begin renumbering.
- Restructure the grid system eliminating nodes which extend laterally from the lengthwise axis of the system.

The remaining error messages occur when problems with the hydrodynamic solution occur. If a time step is specified which is too large, the following error message will be printed:

HYDRODYNAMIC SOLUTION WAS UNSTABLE DURING CYCLE _____ IN
CHANNEL _____ FLOW = _____ CFS, DEPTH = _____ FEET, VELOCITY =
_____ FT/SEC.

The invariant channel data summary following the control summaries contains the column labeled "MAX TIME, SEC". The hydrodynamic time step increment should not exceed the smallest value appearing in this column. The user may wish to modify the network slightly by lengthening channels which control the time step constraint.

Termination of the simulation will also occur if negative volumes or surface areas are encountered. The following error messages are printed if either of these conditions arise.

NEGATIVE SURFACE AREA ENCOUNTERED AT HOUR _____ AT NODE _____,
HEAD = _____ FEET, AREA = _____ SQ FT.

NEGATIVE VOLUME ENCOUNTERED AT HOUR _____ AT NODE _____, HEAD
= _____ FEET, AREA = _____ SQ FT.

These conditions may result from too large a time step or problems with the geometry. If the termination is caused by the geometry one or both of the following adjustments in node/channel configurations are required:

- Decrease area slope (change in surface area with respect to depth) at the node. This adjustment is not applicable when tide flats are being modeled.
- Decrease depth (use hydraulic radius or average depth) in channels which drain the node.

The warnings printed with the channel and node geometry summaries are useful in making these modifications.

Output Review

Once all errors are corrected the computations should go to completion, and the user requested output will be printed. The following is a check list for testing the hydrodynamic model results before proceeding to the quality codes:

- Check for steady-state hydrodynamics by comparing heads at hour 25 with those at hour 50 for a given node. A similar check of flows and velocities for a given channel should also be made. Significant differences indicate that the model should be run for more time steps. This check is not necessary if a continuous simulation is being made (i.e., tidal period = 24).
- Predicted time-stage relationships should agree with tide gauge measurements, both at seaward nodes and at selected stations within the system.
- The average velocity should generally not exceed 0.05 fps except where there are net inflows or rapid changes in velocity such as in a narrow channel draining a large area. High velocities may indicate numerical instabilities caused by too large a time step.
- Water balance at each node should be zero except at tidal exchange nodes where it is equal to the net gain or loss at the boundaries. The water balance will not equal zero if a continuous simulation is being made.

Modifications in roughness coefficients or node-channel configurations may be required in order to produce acceptable model-prototype conformance. Once the above requirements are met to the satisfaction of the user, the model is considered calibrated and ready for evaluating hydrologic conditions and interfacing with water quality models.

V.2 WATER QUALITY MODEL OUTPUT

The water quality model can also be operated in either the computation mode or the high resolution plot mode. In the computation mode, the output provides a printed summary of the simulation conditions and results. Major components of the printed output include:

- Simulation controls.
- Initial quality conditions.

- Quality conditions at the seaward boundary and inflow quality.
- Global and spatially varying chemical, physical and biological coefficients.
- Wind and flow induced reaeration coefficients.
- Quality results by node at user specified time intervals.
- Quality results by node at four hour intervals for final day of simulation.
- Average quality by node for final day of simulation.

To supplement the tabular output, the following optional printer plots may be specified:

- Concentration versus time for user selected parameters and nodes.
- Concentration versus location for user selected parameters and times.

In addition to the normal printer output, two files are provided for meteorological data and error and diagnostic messages. A third is provided to save model results for use in the high resolution plot mode. In the high resolution plot mode, several types of plots are available. They include:

- Time series of simulated quality at selected times or simulated daily maxima and minima.
- Profile plots of simulated quality at selected times or simulated daily maxima or minima. With this option, observed data may also be plotted.
- Time series or profile plots of simulated quality for two separate simulations.

These plot options utilize standard CALCOMP routines and require a high resolution digital plotter.

Diagnostic and Error Messages

In addition to the normal printout, there are several diagnostic and error messages that describe potential problems with the input data or simulation results. If one of the following messages are printed, dimension limits have been exceeded and the simulation will terminate.

* ERROR * THE FOLLOWING NODE LIMITS ARE IN ERROR (Node numbers must be less than 167)

ERROR ** THE MAXIMUM OF 100 INFLOW LOCATIONS HAS BEEN EXCEEDED
(Up to 500 inflows are allowed but they must not be tributary
to more than 100 nodes)

If either of these messages appear, the model representation must be modified to meet existing constraints or the program dimensions increased to meet the additional requirements of the problem.

As the simulation progresses, the following message may appear on the diagnostic output file.

- CONC, HOUR = _____, DAY = _____, NODE = _____, C# = _____,
C = _____, SET TO _____

This message informs the user that a negative concentration has been encountered. Negative concentrations are not uncommon, particularly at the beginning of the simulation and are not reason for concern if the magnitude is not large (e.g., -.01 for BOD). When negatives are encountered, the concentration is set to the mean of all adjacent nodes and the simulation proceeds. Should the magnitude of the negative become large, numerical instability problems may exist and the input data and geometric representation should be reviewed.

Output Review

After all data errors have been eliminated and the model seems to behave properly (i.e., only a few small negative concentration corrections), the user will probably want to improve the results by calibrating the model to observed data. The model requires 31 chemical, physical and biological coefficients (see Table IV-1), plus sink rates for ammonia, phosphate and DO. During the calibration process, many of these coefficients may need to be changed to obtain the desired results. Some of these coefficients have a greater effect on the results than others. The following is a list of parameters and the corresponding rate coefficients which have the greatest effect on the computed concentration.

Nitrate N - Ammonia decay rate
 - Algal growth rate
 - Nitrogen fraction of algae

Phosphate P - Algal growth and respiration rate
 - Phosphorous fraction of algae

Coliform Bacteria - Coliform dieoff rate

Detritus - Detritus decay rate
 - Detritus settling velocity

Carbonaceous BOD - BOD decay rate

Ammonia N

- Ammonia decay rate
- Algal growth and respiration rate
- Detritus decay rate

Dissolved Oxygen

- Algal growth and respiration rate
- BOD and detritus decay rate

Algae 1 and 2

- Algal growth and respiration rates
- Half-saturation constants
- Depth of 1% light penetration
- Algal settling velocity

After the user is satisfied that the model adequately reproduces the water quality responses observed in the prototype, the model can be considered calibrated and is ready for evaluating different environmental conditions.

VI. EXAMPLE APPLICATION

VI.1 HYDRODYNAMIC MODEL

The example application utilizes the link-node network developed for the Stockton Ship Channel deepening project. The network, shown on Figure VI-1 encompasses much of the Sacramento-San Joaquin River Delta system and is designed for maximum detail in the vicinity of the Stockton Ship Channel near Stockton with less detail elsewhere.

The example application includes three sets of boundary conditions and demonstrates many of the program's options. The input data shown on Figure VI-2 can be reviewed along with the description of the input requirements in Chapter IV for a more detailed description of this application if desired.

The printed output generated by the program is shown on Figure VI-3. To aid in the interpretation of this output, the following page by page description is provided.

- Page 1 The first page of output provides a summary of file assignments, simulation controls and print and plot options.
- Pages 2-5 These pages summarize the channel geometry data and include values input via card type 14. The columns headed by MAX DEP, FT and CRIT TIME, SEC are depths at which the channel cross section area will become negative and the time step below which the channel may cause numerical instabilities in the model respectively.
- Pages 6-8 These pages summarize the node geometry data and include values input via card type 13. The MAX DEPTH, FT column is the depth at which the surface area becomes negative due to the sloping sides. Observe that the note indicating a channel may drain an adjoining node appears at the bottom of page 8. This note appears because the bottom of channel 200 is below the bottom of node 163 which is within the anticipated range in tidal stage. This situation does not create a problem, however, since the computed stage does not reach that elevation due to backwater effects.
- Page 9 This page is a summary of results of the waveform equation curve fit of the tide data at the seaward boundary. This page is the beginning of the output that is generated for each set of boundary conditions. This output includes a column of the difference between computed and observed tidal stage. If the differences are greater than .2 or .3, there is probably an error in the input data on card 17. Note that the computed stage at hour 0 and hour 24 are equal. This reflects the input tide data which had a tidal period

of exactly 24 hours. This was done so that a repetitive dynamic solution could be reached for the first set of boundary conditions.

- Page 10 This page summarizes the evaporation rates and inflows and withdrawals. The evaporation rate has been set to zero since evaporation is included in the channel depletion. The channel depletion has been added to the point withdrawals and appears in the WITHDRAWAL column.
- Page 11 This page is an hourly summary of the computed tidal stage for the last two daily time steps at the 6 nodes specified on card 3. Note that the stage at hours 24 and 48 are equal indicating that a repetitive dynamic solution has been reached.
- Page 12 This page is an hourly summary of the computed flow and velocity in the 6 channels specified on card 4.. The flows at hours 24 and 48 are not exactly equal and indicate that a truly repetitive dynamic solution has not been reached. Matching flow is a much more exacting test for a repetitive dynamic solution and small differences of this magnitude are normally acceptable. The negative sign associated with the flow and velocity values indicates flow to the adjacent node with the lowest number.
- Pages 13-14 These pages provide the average, maximum, minimum water surface elevation, the tidal range, water balance and average volume for each node in the system. Node 1 is the tidal boundary node and its water balance is the net seaward flow. The water balance at the remaining nodes is the total flow imbalance over the final daily time step. The water balance will be zero for all non-boundary nodes when a repetitive dynamic solution has been reached. The flow imbalance of 103 cfs at node 151 (Clifton Court forebay) would normally be considered excessive and would indicate additional time steps.
- Pages 15-16 These pages provide the average, minimum and maximum channel flows and velocities and a good indication of the net transport within the system. This table also provides the maximum hydraulic gradient (feet/1000 feet) reached during the simulation and the length of time any channel was dry (normally 0.0).
- Pages 17-18 These plots are for stage versus time and velocity versus time for the three nodes and channels specified on card types 6 and 7 respectively. These nodes and channels must be included on pages 11 and 12. Nodes or channels not included in the time series printout will appear as a horizontal line at stage or velocity zero.

To supplement the printed output several high resolution plot options are available. Four of these options are shown in Figure VI-4. The first plot presents the observed and simulated water surface elevation at one node as a time series over the simulation period. The second plot is a comparison between the same observed water surface elevation and the computed value for the point in time. This plot gives a good indication of the accuracy of the water surface elevation prediction. If the model exactly reproduced the data observations, all points would fall on the 45 line. The statistical evaluation of the computed versus observed data are shown in Figure VI-3, page 19. Plots number 3 and 4 show the computed water surface elevation and flow at three nodes and channels respectively. Associated with these plots is printed output (page 19) of the data observations and any comments regarding the plots. Note that only two of the three specified velocity plots were made since channel 57 was not included in the list of channel (card type 9).

VI.2 WATER QUALITY MODELS

The water quality example application utilizes the Stockton Ship Channel network and the hydrodynamic solution described above. The example application has one set of boundary conditions and uses the option of reusing the hydrodynamic interface output on a daily basis. Many of the program options are demonstrated in this application. The input data shown on Figure VI-5 and the input requirements in Chapter IV can be reviewed for a more detailed definition of this application. The printed output for the example application is presented on VI-6. To aid in the interpretation of the output, the following page by page description is provided.

- Page 1 Page one contains simulation and output controls and a list of quality parameters considered in the model.
- Page 2-3 These pages contain the initial conditions. Note that the initial conditions are input on a node by node basis. Initial conditions are usually input by zones due to lack of data, however, these data were generated by a prior model simulation.
- Page 4 Page four is an echo print of the exchange and inflow quality. Note that an inflow rate of zero is indicated on the inflow data printout. If a zero flow is entered for the inflow rate, the value assigned in the hydrodynamic simulation is used. This page also contains all of the quality coefficients used during the simulation. The system coefficients (listed first) are not input with the data deck but are defined in the BLOCK DATA.
- Page 5 Page five contains a node by node list of the flow and wind induced reaeration coefficients using the first set of hydrodynamic and a 10 mile/hour wind. These rates will change as the simulation progresses due to changing

conditions. They are printed to give an indication of the relative magnitude at each node.

Pages 6-9 These pages show the simulation results for hours 12 and 24 on day 248. This output is controlled by the user by the daily and hourly printout frequency. The simulation results for hours 4, 8, 12, 16, 20 and 24 are automatically printed for the last day of simulation. These printouts, however, have been omitted to reduce the volume of output presented here.

Pages 10-11 These pages show the average quality for the last day of simulation. This output will automatically appear.

Page 12 This printer plot shows the computed dissolved oxygen profile for hours 6, 12 and 18 of the last day of simulation.

Page 13 This printer plot is a time series of dissolved oxygen at node 18 over the simulation period. Note that the DO level is continuing to decrease with time indicating the effects of the initial conditions are probably influencing the solution.

To supplement the water quality printed output, there are 6 high resolution plot options available. Three of these options are shown in Figure VI-6. The first page contains two plots. The upper plot shows the computed dissolved oxygen concentration at three nodes for the final two days of simulation. The lower plot shows a computed concentration profile for a series of adjacent channels at two points in time. Observed oxygen ranges at selected locations are also plotted. The third plot (page two) shows the daily range in the computed oxygen concentration during day 248 for a series of adjacent nodes. Oxygen observations are also plotted. Any comments describing plot difficulties will be printed in the output (see Figure V-6, page 14).

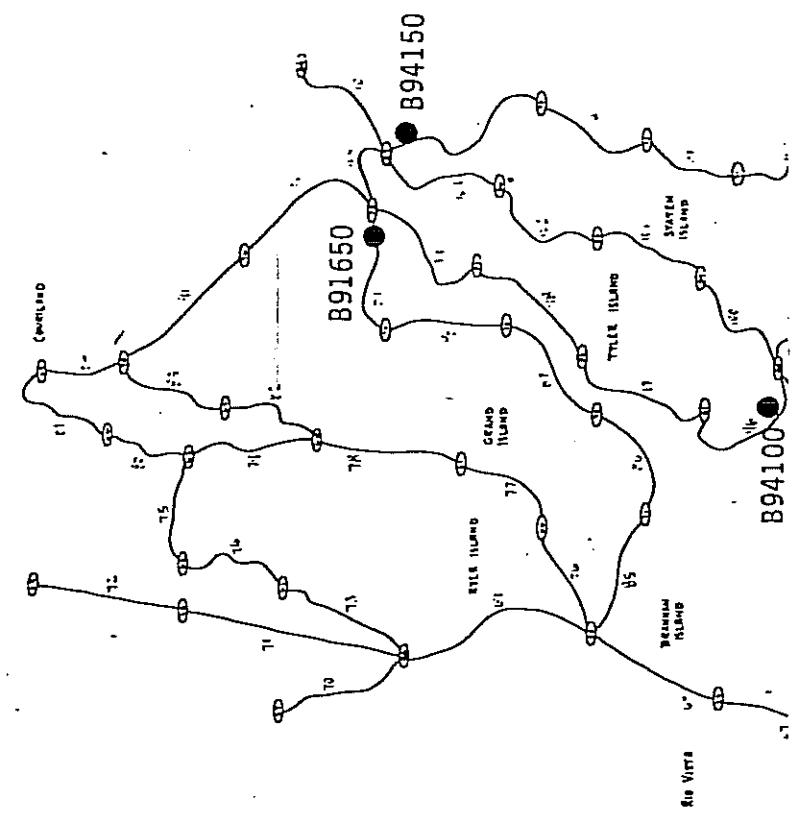


FIGURE VI-1
LINK-NODE MODEL REPRESENTATION OF THE DELTA

FIGURE VI-2
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 1

CARD
TYPE

DATA

BAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY													
1	0												
2	6	6	1	1	0	2	25	32	11	12	1		
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	12	25	55	151	143								
5	15	21	27	51	54								
6	143	151											
7	15	21	27										
8	62	104	190	66	8	12	15	35	21	47	24	27	49
9	168	169	69	76	83	99	103	109	51				
10	2	53	54	59	75	65	90	87	89	4	112	118	8
11	143	144	146	147	128	142	150	25	22	11	16	34	163
12	75	1											
12a	-6	-6	24	8									
12b	NO TIDE DATE												
12b	51	151	36										
12b	END OF CLIFTON CT.												
13	82700000.	0.	28.9	0.54	7.73								
13	28700000.	0.	21.2	1.34	8.42								
13	35450000.	0.	23.7	1.90	7.34								
13	44760000.	0.	24.0	3.05	7.15								
13	54980000.	0.	18.0	4.12	7.47								
13	63270000.	0.	20.0	4.80	7.84								
13	72340000.	0.	22.0	5.40	8.44								
13	82500000.	0.	26.0	5.35	9.18								
13	92830000.	0.	28.0	6.14	9.29								
13	102580000.	0.	28.0	6.93	9.74								
13	113430000.	0.	18.0	7.81	9.53								
13	122280000.	0.	20.0	7.95	8.99								
13	131600000.	0.	20.0	8.39	8.47								
13	141000000.	0.	30.0	8.80	8.37								
13	15450000.	0.	30.0	9.20	8.32								
13	16510000.	0.	22.3	9.51	8.13								
13	17440000.	0.	21.8	9.85	7.89								
13	18300000.	0.	21.4	10.26	7.59								
13	19540000.	0.	19.8	10.62	7.18								
13	20500000.	0.	17.9	10.93	6.69								
13	213590000.	0.	20.8	11.35	6.64								
13	22370000.	0.	19.4	11.74	6.65								
13	23306000.	0.	20.4	12.12	6.44								
13	24270000.	0.	21.5	12.44	6.19								
13	25270000.	0.	21.3	12.70	5.88								
13	262500000.	0.	23.4	12.95	5.68								
13	272150000.	0.	21.8	13.21	5.53								
13	281540000.	0.	25.8	13.58	5.45								
13	291320000.	0.	29.7	13.79	5.46								
13	302500000.	0.	32.3	14.00	5.47								
13	311500000.	0.	20.0	14.27	5.50								
13	331990000.	0.	7.913.71	3.70	197								
13	342260000.	0.	6.813.70	3.05	41								
13	352020000.	0.	6.313.68	2.29	42								
13	361690000.	0.	5.514.19	1.72	43								
13	37850000.	0.	7.0	12.49	5.69								
13	38570000.	0.	7.0	12.53	5.45								
13	39570000.	0.	7.0	12.64	5.25								
13	40570000.	0.	7.0	12.89	5.07								
13	419000000.	0.	20.0	8.99	7.98								
13	425300000.	0.	20.0	9.82	7.64								
13	433900000.	0.	16.0	10.10	7.93								
13	44750000.	0.	10.	13.46	5.28								
13	45910000.	0.	9.	13.32	5.16								
13	46750000.	0.	9.	13.51	5.03								
13	48900000.	0.	8.0	12.86	6.30								
13	491200000.	0.	6.0	13.27	5.79								
13	508200000.	0.	11.0	2.75	7.85								
13	5152500000.	0.	24.1	2.74	8.38								
13	5250200000.	0.	25.6	3.94	9.15								
13	5353300000.	0.	23.4	4.70	9.83								
13	5439700000.	0.	21.7	5.1010	9.90								
13	5533000000.	0.	23.0	5.6011	9.77								
13	5629000000.	0.	26.2	5.3513	4.48								
13	5749000000.	0.	22.0	4.8814	3.39								
13	5826000000.	0.	25.0	5.7015	2.22								
13	5926000000.	0.	25.0	5.8916	4.42								
13	6130000000.	0.	14.4	5.9014	4.42								
						73	74						

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 2

CARD TYPE	DATA									
13	62	3400000.	0.	11.5	6.0915.21	74	75			
13	63	2900000.	0.	12.2	6.9815.22	79	80	75		
13	64	2200000.	0.	13.6	7.1115.89	80	81			
13	65	76600000.	0.	16.3	7.6516.43	84	81			
13	66	6200000.	0.	9.7	6.4712.38	76	77			
13	67	5300000.	0.	7.4	6.9813.04	77	78			
13	68	4400000.	0.	8.4	7.1314.21	78	82	79		
13	69	2400000.	0.	9.7	7.3714.93	82	83			
13	70	6000000.	0.	16.1	7.7415.78	91	84	83		
13	71	6700000.	0.	12.4	6.6111.56	85	86			
13	72	6000000.	0.	11.7	7.4011.97	86	87			
13	73	6000000.	0.	13.5	8.1112.72	87	88			
13	74	4800000.	0.	15.6	8.0613.70	88	89			
13	75	5800000.	0.	18.6	9.0813.83	89	90	99	104	
13	76	4400000.	0.	21.6	8.6514.84	90	91			
13	80	20000000.	0.	17.9	7.8210.58	95	105	100	96	
13	81	5000000.	0.	19.3	7.4211.13	96	97			
13	82	2400000.	0.	18.9	7.8912.11	97	98			
13	83	3200000.	0.	17.6	8.5713.00	98	99			
13	84	3400000.	0.	18.4	8.5911.19	100	101			
13	85	4400000.	0.	17.6	8.8812.03	101	102			
13	86	4800000.	0.	14.8	9.2412.83	102	103			
13	87	5400000.	0.	10.5	9.5313.77	103	111	109	110	104
13	88	12000000.	0.	5.6	9.7214.70	111				
13	89	1200000.	0.	7.5	10.2014.44	110				
13	90	13500000.	0.	17.4	9.6010.20	105	106	119		
13	91	8100000.	0.	17.8	9.4310.93	106	107			
13	92	7900000.	0.	15.2	9.6811.68	107	108			
13	93	5000000.	0.	13.4	9.9612.53	108	109			
13	95	12600000.	0.	19.0	8.71 9.26	115	116			
13	96	10000000.	0.	16.3	9.71 9.50	118	119	120		
13	97	8100000.	0.	18.0	9.51 8.90	116	117	118		
13	98	11000000.	0.	14.1	10.57 8.81	120	121	123		
13	99	9500000.	0.	15.0	10.54 8.37	124	125	123		
13	100	6600000.	0.	8.7	11.58 9.23	121	122			
13	101	13600000.	0.	10.6	11.52 8.08	125	122	126		
13	102	3400000.	0.	7.8	12.32 7.21	126	127			
13	103	1300000.	0.	7.0	12.07 6.99	128	127			
13	104	1500000.	0.	7.0	13.18 6.05	129	130			
13	105	1000000.	0.	5.0	13.66 6.29	130				
13	110	47000000.	0.	3.4	4.70 6.80	135	136			
13	111	6800000.	0.	9.4	5.34 7.10	137	138	136		
13	112	8900000.	0.	12.7	6.28 7.03	138	139	155		
13	113	21800000.	0.	17.6	6.06 8.28	133	134	141	139	140
13	114	13000000.	0.	11.8	6.51 7.99	140	153	146		
13	115	18000000.	0.	12.3	6.71 8.20	141	142	145		
13	116	34000000.	0.	12.8	7.69 8.50	143	150	142	149	144
13	117	18000000.	0.	10.1	7.60 7.70	152	151	149	148	
13	118	26000000.	0.	9.0	7.18 7.30	154	152	153	174	
13	119	68000000.	0.	7.7	7.21 8.08	148	144	145	146	174
13	121	5450000.	0.	9.0	6.76 6.87	155	154	156		
13	122	1300000.	0.	9.6	6.80 6.18	156				
13	123	1400000.	0.	9.6	6.81 6.00	157				
13	124	14000000.	0.	20.5	7.80 6.80	151	159	158		
13	125	12000000.	0.	21.3	8.34 7.10	150	159	160		
13	126	17400000.	0.	18.1	7.85 5.99	158	169	157		
13	127	9000000.	0.	27.2	9.22 7.38	162	161	163		
13	128	9300000.	0.	22.3	9.36 6.74	160	163	164		
13	129	15400000.	0.	18.6	9.04 5.90	164	168	167		
13	130	15300000.	0.	17.8	8.23 4.99	169	170	175		
13	131	12500000.	0.	17.8	8.96 4.99	168	176	170		
13	135	9400000.	0.	14.4	10.24 5.94	167	166			
13	136	2500000.	0.	17.0	10.51 6.44	165	166			
13	140	15500000.	0.	14.1	8.20 4.20	173	177	178		
13	141	9600000.	0.	14.8	9.38 4.18	176	177	180		
13	142	8600000.	0.	10.8	9.99 3.50	180	179	187		
13	143	21600000.	0.	15.7	8.24 2.50	178	179	181	51	
13	144	11700000.	0.	12.3	8.50 1.40	181	182	183		
13	145	4800000.	0.	11.7	10.15 1.43	183	184			
13	146	3800000.	0.	8.9	10.09 0.30	182	185			
13	147	8200000.	0.	10.2	11.66 1.10	184	186	185		
13	148	3600000.	0.	5.4	11.89 3.47	187	188			
13	149	1900000.	0.	4.0	12.66 2.70	188	189			
13	150	4300000.	0.	9.5	12.66 1.56	189	186	190		
13	151	101000000 35000.	0.	10.0	7.51 1.74	51				
13	158	13000000.	0.	9.0	13.70 4.85	55	196			

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 3

CARD TYPE	DATA							
13	159	1500000.	0.	9.0	13.88	4.47	196	197
13	162	4200000.	0.	9.3	13.82	1.19	190	199
13	163	12000000.	0.	2.5	14.30	0.51	200	200
13	0							
14	1	13000.	3000.	30.0	0.027	1	2	6.0
14	2	15000.	3300.	14.0	0.027	2	3	6.0
14	3	14500.	2350.	29.7	0.025	3	4	6.0
14	4	13500.	3100.	20.3	0.025	4	5	6.0
14	5	9600.	2800.	20.0	0.027	6	5	6.0
14	6	10300.	2000.	28.0	0.027	7	6	6.0
14	7	9000.	2000.	22.0	0.027	8	7	6.0
14	8	12000.	1800.	32.0	0.027	9	8	6.0
14	9	13000.	2100.	26.0	0.027	10	9	6.0
14	10	11500.	2100.	26.0	0.027	11	10	6.0
14	11	7000.	2000.	23.0	0.027	12	11	6.0
14	12	9200.	1800.	18.0	0.028	13	12	6.0
14	13	5300.	510.	34.4	0.027	13	14	4.0
14	14	4800.	565.	29.0	0.027	14	15	7.0
14	15	5100.	700.	31.8	0.027	15	16	6.0
14	16	5000.	700.	24.3	0.027	16	17	8.0
14	17	6500.	480.	25.1	0.027	17	18	8.0
14	18	6800.	750.	24.9	0.027	18	19	6.0
14	19	6800.	985.	25.5	0.027	19	20	6.0
14	20	5200.	670.	22.1	0.027	20	21	5.5
14	21	5200.	720.	19.6	0.027	21	22	7.0
14	22	5500.	665.	21.8	0.027	22	23	6.0
14	23	5200.	475.	25.2	0.027	23	24	6.0
14	24	5200.	565.	22.5	0.027	24	25	5.0
14	25	4000.	615.	24.2	0.027	25	26	6.0
14	26	4000.	635.	23.3	0.027	26	27	7.0
14	27	3500.	505.	23.6	0.027	27	28	4.4
14	28	3000.	440.	31.3	0.027	28	29	2.5
14	29	3000.	440.	30.6	0.027	29	30	3.0
14	30	3000.	300.	22.0	0.030	30	31	3.0
14	31	3000.	300.	8.0	0.038	24	48	4.0
14	32	11200.	1000.	30.0	0.028	13	14	6.0
14	33	6000.	700.	45.0	0.028	14	41	6.0
14	34	5400.	900.	15.0	0.030	15	41	6.0
14	35	3000.	400.	7.0	0.038	26	49	5.0
14	36	7600.	550.	18.0	0.038	16	42	6.0
14	37	2700.	300.	10.0	0.038	17	42	6.0
14	38	6300.	350.	25.0	0.035	18	42	6.0
14	39	3500.	450.	23.0	0.040	17	43	6.0
14	40	6800.	450.	14.0	0.040	18	43	6.0
14	41	11900.	213.	7.0	0.027	33	34	6.
14	42	11580.	181.	6.5	0.027	34	35	6.
14	43	9420.	188.	6.0	0.027	35	36	6.
14	44	3750.	150.	7.0	0.030	25	37	6.
14	45	3750.	150.	7.0	0.030	37	38	6.
14	47	3750.	150.	7.0	0.030	38	39	6.
14	48	3750.	150.	7.0	0.030	39	40	6.
14	49	3750.	150.	7.0	0.030	40	45	6.
14	46	8600.	500.	12.0	0.033	19	20	6.0
14	51	5000.	500.	20.0	0.030	143	151	0.0
14	52	2500.	200.	10.0	0.030	28	44	6.
14	53	2500.	200.	10.0	0.030	44	45	6.
14	54	3000.	250.	10.0	0.030	45	46	6.
14	55	3000.	250.	10.0	0.030	46	158	6.
14	59	19000.	960.	31.0	0.027	1	3	6.0
14	60	6000.	400.	10.5	0.035	50	4	6.0
14	61	3000.	2000.	3.5	0.035	51	50	6.0
14	62	18000.	3000.	23.9	0.027	2	51	6.0
14	63	17300.	2800.	24.	0.027	51	52	6.0
14	64	12600.	2700.	24.0	0.027	52	53	6.0
14	65	17000.	800.	17.0	0.027	52	53	6.0
14	66	19000.	500.	24.2	0.025	8	53	6.0
14	67	14000.	2700.	18.	0.027	53	54	6.0
14	68	14000.	2400.	18.	0.027	54	55	6.0
14	69	21000.	800.	33.3	0.027	55	56	6.0
14	70	10000.	800.	22.0	0.032	56	57	6.0
14	71	53000.	500.	30.0	0.028	56	58	6.0
14	72	53000.	500.	30.0	0.028	58	59	6.0
14	73	13000.	200.	16.4	0.035	56	61	6.0
14	74	13000.	200.	12.4	0.035	62	61	6.0
14	75	12000.	250.	10.7	0.035	63	62	6.0
14	76	12000.	500.	10.7	0.035	55	66	6.0

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 4

CARD TYPE	DATA								
14	77	12000.	450.	8.3	0.035	66	67	68	6.0
14	78	12000.	450.	6.2	0.035	67	68	69	6.0
14	79	12000.	120.	10.3	0.035	68	69	70	6.0
14	80	12000.	200.	13.4	0.035	69	70	71	6.0
14	81	12000.	200.	11.9	0.035	70	71	72	6.0
14	82	12000.	200.	12.0	0.035	70	71	72	6.0
14	83	12000.	200.	7.3	0.035	70	71	72	6.0
14	84	12000.	450.	15.9	0.034	70	71	72	6.0
14	85	13500.	500.	14.2	0.033	71	72	73	6.0
14	86	13000.	500.	10.6	0.033	71	72	73	6.0
14	87	13500.	450.	12.9	0.033	72	73	74	6.0
14	88	13500.	350.	14.2	0.033	73	74	75	6.0
14	89	13500.	350.	16.9	0.033	74	75	76	6.0
14	90	15000.	300.	22.4	0.032	75	76	77	6.0
14	91	15000.	300.	20.9	0.033	76	77	78	6.0
14	95	19500.	840.	18.5	0.040	81	80	81	6.0
14	96	17000.	150.	19.0	0.035	80	81	82	6.0
14	97	17000.	180.	19.5	0.035	81	82	83	6.0
14	98	17000.	150.	18.1	0.035	82	83	84	6.0
14	99	17000.	150.	17.1	0.035	83	84	85	6.0
14	100	15000.	400.	20.0	0.035	80	81	82	6.0
14	101	15000.	350.	18.0	0.035	84	85	86	6.0
14	102	15000.	300.	14.8	0.035	85	86	87	6.0
14	103	13500.	250.	14.7	0.038	86	87	88	6.0
14	104	8000.	150.	12.9	0.027	75	76	77	6.0
14	105	27000.	600.	17.3	0.040	80	81	82	6.0
14	106	14000.	450.	18.8	0.035	90	91	92	6.0
14	107	13000.	350.	16.2	0.035	91	92	93	6.0
14	108	13500.	270.	14.2	0.035	92	93	94	6.0
14	109	18000.	100.	11.7	0.035	87	88	89	6.0
14	110	24600.	100.	7.6	0.040	87	88	89	6.0
14	111	15000.	200.	5.7	0.040	87	88	89	6.0
14	115	11000.	700.	19.0	0.040	92	93	94	6.0
14	116	13300.	350.	26.0	0.040	95	96	97	6.0
14	117	9000.	450.	18.0	0.040	96	97	98	6.0
14	118	10000.	500.	16.5	0.040	97	98	99	6.0
14	119	12000.	400.	15.6	0.037	96	97	98	6.0
14	120	16000.	400.	16.6	0.037	96	97	98	6.0
14	121	20000.	330.	9.4	0.040	98	99	100	6.0
14	122	11000.	300.	7.2	0.035	100	101	102	6.0
14	123	6000.	280.	12.0	0.035	99	100	101	6.0
14	124	7500.	450.	18.0	0.035	43	44	45	6.0
14	125	14000.	400.	15.0	0.040	99	100	101	6.0
14	126	17500.	300.	8.2	0.035	101	102	103	6.0
14	127	5000.	180.	6.0	0.040	103	102	101	6.0
14	128	6000.	180.	6.0	0.040	22	23	24	6.0
14	129	6000.	100.	8.0	0.035	23	24	25	6.0
14	130	6500.	100.	6.0	0.033	104	105	106	6.0
14	133	8000.	700.	22.0	0.030	7	113	114	6.0
14	134	12000.	350.	13.1	0.035	9	113	114	6.0
14	135	4000.	3000.	3.3	0.030	5	110	111	6.0
14	136	3000.	1000.	3.4	0.030	111	110	111	6.0
14	137	16000.	350.	13.9	0.035	5	111	112	6.0
14	138	11000.	350.	10.3	0.040	111	112	113	6.0
14	139	26000.	270.	15.5	0.038	113	112	114	6.0
14	140	13000.	300.	17.2	0.040	113	114	115	6.0
14	141	9000.	500.	18.0	0.035	113	114	115	6.0
14	142	14000.	400.	18.0	0.040	116	115	116	6.0
14	143	8000.	800.	18.0	0.035	12	116	117	6.0
14	144	7500.	3000.	5.0	0.032	116	117	118	6.0
14	145	6300.	3000.	5.0	0.032	119	118	117	6.0
14	146	4500.	3000.	5.0	0.032	119	118	117	6.0
14	148	7800.	3000.	5.0	0.032	117	119	118	6.0
14	149	10000.	700.	18.0	0.040	116	117	118	6.0
14	150	18000.	450.	23.5	0.038	116	125	126	6.0
14	151	12000.	300.	20.3	0.040	124	117	116	6.0
14	152	7500.	300.	11.8	0.040	118	117	116	6.0
14	153	13000.	350.	15.0	0.040	118	117	116	6.0
14	154	10000.	270.	6.2	0.040	121	118	117	6.0
14	155	7000.	350.	8.0	0.040	112	121	120	6.0
14	156	8000.	300.	8.4	0.040	121	122	123	6.0
14	157	11000.	300.	10.3	0.045	126	123	124	6.0
14	158	13500.	600.	24.1	0.040	124	126	125	6.0
14	159	10000.	600.	22.0	0.040	125	124	123	6.0
14	160	13500.	350.	20.0	0.040	125	128	127	6.0
14	161	8400.	800.	17.0	0.035	41	127	126	6.0

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 5

CARD TYPE	DATA							
14	162	8000.	320.	16.0	0.035	42	127	6.0
14	163	9000.	600.	21.0	0.040	128	127	6.0
14	164	15000.	700.	23.0	0.037	129	128	6.0
14	165	6300.	300.	14.0	0.033	20	136	6.0
14	166	7700.	400.	16.0	0.033	136	135	6.0
14	167	15500.	300.	14.0	0.033	129	135	6.0
14	168	12000.	700.	14.0	0.037	129	131	6.0
14	169	19000.	550.	24.0	0.040	126	130	6.0
14	170	7900.	326.	3.8	0.038	130	131	6.0
14	174	11800.	3375.	7.7	0.032	118	119	6.0
14	175	13000.	590.	16.1	0.035	130	140	6.0
14	176	15000.	540.	18.0	0.035	131	141	6.0
14	177	13500.	360.	13.0	0.035	140	141	6.0
14	178	26000.	350.	17.0	0.035	140	143	6.0
14	179	25000.	300.	13.7	0.035	143	142	6.0
14	180	14400.	370.	14.0	0.035	141	142	6.0
14	181	13500.	300.	16.9	0.035	143	144	6.0
14	182	25000.	230.	7.0	0.030	144	146	6.0
14	183	21500.	420.	11.0	0.028	144	145	6.0
14	184	18500.	370.	10.0	0.038	143	147	6.0
14	185	26000.	175.	4.0	0.032	147	146	6.0
14	186	18000.	180.	11.0	0.032	147	150	5.5
14	187	24900.	220.	5.1	0.033	142	148	5.5
14	188	21000.	100.	4.8	0.035	148	149	5.5
14	189	17700.	45.	5.5	0.038	149	150	5.5
14	190	21100.	180.	8.2	0.030	150	162	5.5
14	196	6000.	250.	10.0	0.033	158	159	6.0
14	197	11300.	186.	8.9	0.027	159	33	6.
14	199	8500.	174.	5.0	0.027	36	162	6.
14	200	12500.	375.	4.0	0.027	162	163	6.
14	0							
15	HYDRODYNAMIC CALIBRATION .. CONDITION #1							
16	1	1	0	2	0	0	0	
17	-1.00		2.33		6.75	-1.02	12.50	2.19
17	17.75		0.37		23.00	2.53	30.75	-1.02
18	1	163	0.					
18	151	151	10.					
18	0							
20	2	0.	0.					
20	3	0.	0.					
20	4	0.001223	0.026720					
20	5	0.010495	0.001098					
20	7	0.006245	0.					
20	8	0.006245	0.					
20	9	0.006245	0.					
20	10	0.003863	0.					
20	11	0.003541	0.					
20	12	0.003541	0.					
20	13	0.001288	0.					
20	14	0.001706	0.					
20	15	0.001288	0.					
20	16	0.002253	0.					
20	17	0.002253	0.					
20	18	0.002253	0.					
20	19	0.002253	0.					
20	20	0.003863	0.					
20	21	0.003863	0.					
20	22	0.003863	0.					
20	23	0.003638	0.					
20	24	0.004829	0.					
20	25	0.004829	0.					
20	26	0.004604	0.001684					
20	27	0.004829	0.					
20	28	0.001030	0.					
20	31	0.001513	0.016325					
20	32	0.006213	0.001098					
20	33	0.006374	0.					
20	34	0.011267	0.					
20	35	0.006020	0.006735					
20	36	0.014133	0.003294					
20	37	0.044490	0.107833					
20	38	0.004797	0.121742					
20	39	0.015968	0.075327					
20	41	0.005923	0.					
20	42	0.005730	0.					
20	43	0.004797	0.					

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 6

CARD TYPE	DATA	
20a	64	0.014261
20a	65	0.105753 0.041435
20a	66	0.006439
20a	67	0.013746
20a	68	0.008853
20a	69	0.004938
20a	70	0.012330
20a	71	0.010817
20a	72	0.003509
20a	73	0.004636
20a	74	0.007565
20a	75	0.004797
20a	76	0.025078
20a	80	0.011364
20a	81	0.005505
20a	82	0.007276
20a	83	0.004314
20a	84	0.007758
20a	85	0.006181
20a	86	0.005473
20a	87	0.007694
20a	88	0.014680 0.005271
20a	89	0.010012 0.020205
20a	90	0.012459 0.000586
20a	91	0.014841 0.004685
20a	92	0.011943 0.006003
20a	93	0.017191 0.015300
20a	95	0.002801
20a	96	0.016644 0.003294
20a	97	0.002801
20a	98	0.004410
20a	99	0.003219
20a	100	0.011622 0.013690
20a	101	0.011267 0.008053
20a	102	0.015324 0.011786
20a	110	0.001738 0.023792
20a	111	0.003348 0.004685
20a	112	0.009497 0.000366
20a	113	0.006020
20a	114	0.002543
20a	115	0.001803
20a	116	0.003187
20a	117	0.004797
20a	118	0.001674
20a	121	0.005793
20a	123	0.004314 0.044656
20a	124	0.004732
20a	125	0.002833
20a	126	0.012169 0.019107
20a	127	0.005473
20a	128	0.007434
20a	129	0.007758
20a	130	0.004507
20a	131	0.004282
20a	135	0.031646
20a	140	0.021537 0.030893
20a	141	0.011589
20a	142	0.027975
20a	143	0.023114 0.015373
20a	144	0.010817 0.035359
20a	145	0.016676
20a	146	0.006117 0.086603
20a	147	0.016483 0.087116
20a	148	0.021891
20a	149	0.014358
20a	150	0.017448
20a	40	0.000998
20a	45	0.001030
20a	158	0.005473 0.003660
20a	159	0.005473 0.003734
20a	33	0.010636 0.015886
20a	162	0.011396 0.009883
20a	163	0.006632 0.126720
20b	2250.	
20c	163	3000.
20c	89	886.

FIGURE VI-2 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION DATA PAGE 7

CARD TYPE	DATA										
20c	65	16300.	0.								
20c	158	45.									
20c	123	0.	122.								
20c	144	0.	3200.								
20c	151	0.	1660.								
20c	0										
15	HYDRODYNAMIC CALIBRATION .. CONDITION #2										
16	1	0	0	2	0	0	0	0	0		
17a	-1.00		2.53		6.75		-1.02		13.00	2.03	
17a	18.50		-0.09		24.25		2.36		31.50	-1.20	
20b	2200.										
20c	163	2970.	0.								
20c	89	899.	0.								
20c	65	16200.	0.								
20c	158	44.									
20c	123	0.	121.								
20c	144	0.	3180.								
20c	151	0.	1264.								
20c	0										
15	HYDRODYNAMIC CALIBRATION .. CONDITION #3										
16	1	0	0	2	0	0	0	0	0		
17a	-3.50		-0.09		0.25		2.36		7.50	-1.20	
17a	13.50		1.95		19.25		-0.40		24.75	2.33	
20b	2200.										
20c	163	3060.	0.								
20c	89	904.	0.								
20c	65	16000.	0.								
20c	158	45.									
20c	123	0.	122.								
20c	144	0.	3180.								
20c	151	0.	2126.								
20c	0										
ALL											
UNUSED											
DATA											
WOULD											
NOW											
BE											
SKIPPED											
27	ER	SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** STAGE PLOTS									
1	STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY.. PLOT DEMONSTRATION										
1a	0	3									
24	1	11									
25	B95100	0									
26	0.50	3.02	2.50	2.11	4.50	1.13	6.50	0.32	8.50	0.39	
26	10.50	1.37	12.50	2.41	14.50	2.76	16.50	2.05	18.50	1.34	
26	20.50	1.55	22.50	2.42	24.50	3.10	26.50	2.54	28.50	1.55	
26	30.50	0.57	32.50	0.04	34.50	0.89	36.50	1.87	38.50	2.57	
26	40.50	1.98	42.50	1.15	44.50	0.77	46.50	1.65	48.50	2.57	
26	50.50	2.72	52.50	1.73	54.50	0.70	56.50	-0.12	58.50	0.38	
26	60.50	1.37	62.50	2.30	64.50	2.07	66.50	1.16	68.50	0.44	
26	70.50	1.08	/								
24	2	11									
25	B95100	0									
26	0.50	3.02	2.50	2.11	4.50	1.13	6.50	0.32	8.50	0.39	
26	10.50	1.37	12.50	2.41	14.50	2.76	16.50	2.05	18.50	1.34	
26	20.50	1.55	22.50	2.42	24.50	3.10	26.50	2.54	28.50	1.55	
26	30.50	0.57	32.50	0.04	34.50	0.89	36.50	1.87	38.50	2.57	
26	40.50	1.98	42.50	1.15	44.50	0.77	46.50	1.65	48.50	2.57	
26	50.50	2.72	52.50	1.73	54.50	0.70	56.50	-0.12	58.50	0.38	
26	60.50	1.37	62.50	2.30	64.50	2.07	66.50	1.16	68.50	0.44	
26	70.50	1.08	/								
24	3	2	143	151							
24	END										
27	ER	SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** FLOW PLOTS									
1	STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY.. PLOT DEMONSTRATION										
1a	0	2									
24	4	15	21	57							
24	END										
27	ER										
1	END DF										
1	RUN										
1a	0	0									

FIGURE VI-3
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 1

RUN TIME AND DATE * FRI, FEB 28 1986 * 15:31:09

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

NUMBER OF HYDRAULIC CONDITIONS	3
NUMBER OF TIDAL CYCLES PER CONDITION	3 1 1
NUMBER OF HYDRAULIC TIME STEPS PER CYCLE	1152
NUMBER OF QUALITY TIME STEPS PER CYCLE	24
DYNAMIC HYDRAULIC OUTPUT UNIT	11
STEADY STATE HYDRAULICS OUTPUT UNIT	12
TIDAL PERIOD, HOURS	24.
HOURLY RESULTS PRINTED FOR JUNCTIONS	
2 12 25 35 151 143	
HOURLY RESULTS PRINTED FOR CHANNELS	
8 15 21 27 51 54	
FOLLOWING PLOTS WILL BE MADE	
TIDAL STAGE FOR JUNCTIONS	2 143 151
TIDAL FLOW FOR CHANNELS	15 21 27
VELOCITY AND FLOW SAVED FOR PLOTTING FOR CHANNELS (FILES 7 AND 8)	
3 62 104 190 66 8 12 15 35 21 47 24 27 49 53 54	
168 169 69 76 89 99 103 109 51	
WATER SURFACE ELEVATION SAVED FOR PLOTTING FOR NODES (FILE 9)	
2 53 54 59 75 65 90 87 89 4 112 118 8 126 123 143	
143 144 146 147 128 142 150 25 22 11 16 34 163 60 162 151	
CLIFTON COURT SPECIFICATIONS	
C. C. CHANNEL	51
C. C. NODE	151
CONTROL NODE	36

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT ... PAGE 2

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT CHANNEL DATA

CHANNEL	LENGTH, FT	WIDTH, FT	HYD RAD, FT	MAX DEP, FT	MANNINGS N	END JUNCTIONS	SIDE SLOPE	CRIT TIME, SE
1	13000.0	3000.0	30.00	31.00	0.0270	1	2	6.00
2	15000.0	3300.0	14.00	14.20	0.0270	2	3	6.00
3	14500.0	2350.0	29.70	31.00	0.0250	3	4	6.00
4	13500.0	3100.0	20.30	20.80	0.0250	4	5	6.00
5	9600.0	2800.0	20.00	20.50	0.0270	5	6	6.00
6	10300.0	2000.0	28.00	29.30	0.0270	6	7	6.00
7	9000.0	2000.0	22.00	22.80	0.0270	7	8	6.00
8	12000.0	1800.0	32.00	34.00	0.0270	8	9	6.00
9	13000.0	2100.0	26.00	27.10	0.0270	9	10	6.00
10	11500.0	2100.0	26.00	27.10	0.0270	10	11	6.00
11	7000.0	2000.0	23.00	23.90	0.0270	11	12	6.00
12	9200.0	1800.0	18.00	18.60	0.0280	12	13	6.00
13	5300.0	510.0	34.40	41.00	0.0270	13	14	4.00
14	4800.0	565.0	29.00	37.90	0.0270	14	15	7.00
15	5100.0	700.0	31.80	38.00	0.0270	15	16	6.00
16	5000.0	700.0	24.30	29.20	0.0270	16	17	8.00
17	6500.0	480.0	25.10	35.80	0.0270	17	18	8.00
18	6800.0	750.0	24.90	28.10	0.0270	18	19	6.00
19	6800.0	585.0	25.50	30.20	0.0270	19	20	6.00
20	5200.0	670.0	22.10	24.60	0.0270	20	21	5.50
21	5200.0	720.0	19.60	22.00	0.0270	21	22	7.00
22	5500.0	663.0	21.80	24.60	0.0270	22	23	6.00
23	5200.0	475.0	25.20	31.50	0.0270	23	24	6.00
24	5200.0	565.0	22.50	25.40	0.0270	24	25	5.00
25	4000.0	615.0	24.20	28.10	0.0270	25	26	6.00
26	4000.0	635.0	23.30	27.50	0.0270	26	27	7.00
27	3500.0	505.0	23.60	26.80	0.0270	27	28	4.40
28	3000.0	440.0	31.30	34.80	0.0270	28	29	2.50
29	3000.0	440.0	30.60	34.80	0.0270	29	30	3.00
30	3000.0	300.0	22.00	23.20	0.0300	30	31	3.00
31	3000.0	300.0	8.00	8.50	0.0380	24	48	4.00
32	11200.0	1000.0	30.00	33.40	0.0280	13	14	6.00
33	6000.0	700.0	49.00	60.90	0.0280	14	41	6.00
34	3400.0	900.0	15.00	15.90	0.0300	15	41	6.00
35	3000.0	400.0	7.00	7.40	0.0380	28	49	5.00
36	7600.0	550.0	18.00	20.30	0.0380	16	42	6.00
37	2700.0	300.0	10.00	11.30	0.0380	17	42	6.00
38	6300.0	350.0	25.00	36.30	0.0350	18	42	6.00
39	3500.0	450.0	23.00	28.40	0.0400	17	43	6.00
40	6800.0	450.0	14.00	15.70	0.0400	18	43	6.00
41	11900.0	213.0	7.00	7.90	0.0270	33	34	6.00
42	11580.0	181.0	6.50	7.50	0.0270	34	35	6.00
43	9420.0	186.0	6.00	6.80	0.0270	35	36	6.00
44	3750.0	150.0	7.00	8.50	0.0300	25	37	6.00
45	3750.0	150.0	7.00	8.50	0.0300	37	38	6.00
46	8600.0	500.0	12.00	13.10	0.0330	19	20	6.00
47	3750.0	150.0	7.00	8.50	0.0300	38	39	6.00
48	3750.0	150.0	7.00	8.50	0.0300	39	40	6.00
49	3750.0	150.0	7.00	8.50	0.0300	40	45	6.00
50	5000.0	300.0	20.00	20.00	0.0300	143	151	0.00

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 3

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT CHANNEL DATA

CHANNEL	LENGTH, FT	WIDTH, FT	HYD RAD, FT	MAX DEP, FT	MANNINOS N	END JUNCTIONS	SIDE SLOPE	CRIT TIME, S
52	2500.0	200.0	10.00	12.30	0.0300	28	44	6.00
53	2500.0	200.0	10.00	12.30	0.0300	44	45	6.00
54	3000.0	250.0	10.00	11.70	0.0300	45	46	6.00
55	3000.0	250.0	10.00	11.70	0.0300	46	158	6.00
59	19000.0	960.0	31.00	34.80	0.0270	1	3	6.00
60	6000.0	400.0	10.50	11.50	0.0350	4	50	6.00
61	3000.0	2000.0	3.50	3.60	0.0350	50	51	6.00
62	18000.0	3000.0	23.90	24.60	0.0270	2	51	6.00
63	17300.0	2800.0	24.00	24.70	0.0270	51	52	6.00
64	12600.0	2700.0	24.00	24.70	0.0270	52	53	6.00
65	17000.0	800.0	17.00	18.30	0.0270	52	53	6.00
66	19000.0	800.0	24.20	29.40	0.0250	8	53	6.00
67	14000.0	2700.0	18.00	18.40	0.0270	53	54	6.00
68	14000.0	2400.0	18.00	18.50	0.0270	54	55	6.00
69	21000.0	800.0	33.30	39.10	0.0270	55	56	6.00
70	10000.0	800.0	22.00	24.20	0.0320	56	57	6.00
71	53000.0	500.0	30.00	39.30	0.0280	56	58	6.00
72	53000.0	500.0	30.00	39.30	0.0280	58	59	6.00
73	13000.0	200.0	16.40	29.20	0.0350	56	61	6.00
74	13000.0	200.0	12.40	16.50	0.0350	61	62	6.00
75	12000.0	250.0	10.70	12.70	0.0350	62	63	6.00
76	12000.0	500.0	10.70	11.50	0.0350	55	66	6.00
77	12000.0	450.0	8.50	9.10	0.0350	66	67	6.00
78	12000.0	450.0	6.20	6.50	0.0350	67	68	6.00
79	12000.0	120.0	10.50	20.00	0.0350	63	68	6.00
80	12000.0	200.0	15.40	24.20	0.0350	63	64	6.00
81	12000.0	200.0	11.90	15.60	0.0350	64	65	6.00
82	12000.0	200.0	12.00	15.70	0.0350	68	69	6.00
83	12000.0	200.0	7.50	8.70	0.0350	69	70	6.00
84	12000.0	450.0	15.90	18.10	0.0340	65	70	6.00
85	13500.0	500.0	14.20	15.70	0.0330	55	71	6.00
86	13000.0	500.0	10.60	11.40	0.0330	71	72	6.00
87	13500.0	450.0	12.90	14.30	0.0330	72	73	6.00
88	13500.0	350.0	14.20	16.60	0.0330	73	74	6.00
89	13500.0	350.0	16.90	20.60	0.0330	74	75	6.00
90	15000.0	300.0	22.40	33.90	0.0320	75	76	6.00
91	15000.0	300.0	20.90	29.80	0.0330	70	76	6.00
95	19500.0	840.0	18.50	20.00	0.0400	11	80	6.00
96	17000.0	150.0	19.00	25.00	0.0350	80	81	6.00
97	17000.0	180.0	19.50	30.00	0.0350	81	82	6.00
98	17000.0	150.0	18.10	25.00	0.0350	82	83	6.00
99	17000.0	150.0	17.10	25.00	0.0350	75	83	6.00
100	15000.0	400.0	20.00	24.60	0.0350	80	84	6.00
101	15000.0	350.0	18.00	22.30	0.0350	84	85	6.00
102	15000.0	300.0	14.80	18.10	0.0350	85	86	6.00
103	13500.0	250.0	14.70	19.10	0.0380	86	87	6.00
104	8000.0	150.0	12.90	25.00	0.0270	75	87	6.00
105	27000.0	600.0	17.30	19.20	0.0400	80	90	6.00
106	14000.0	450.0	18.80	22.10	0.0350	90	91	6.00
107	13000.0	350.0	16.20	19.50	0.0350	91	92	6.00

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 4

BAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT CHANNEL DATA

CHANNEL	LENGTH, FT	WIDTH, FT	HYD RAD, FT	MAX DEP, FT	MANNINGS N	END JUNCTIONS	SIDE SLOPE	CRIT TIME, SE
108	13500.0	270.0	14.20	17.70	0.0350	92	93	557.64
109	18000.0	100.0	11.70	16.67	0.0350	87	93	6.00
110	24600.0	100.0	7.60	11.80	0.0400	87	89	6.00
111	15000.0	200.0	5.70	6.30	0.0400	87	88	6.00
115	11000.0	700.0	19.00	20.90	0.0400	12	95	6.00
116	13300.0	350.0	26.00	39.20	0.0400	93	97	6.00
117	9000.0	450.0	18.00	21.00	0.0400	16	97	6.00
118	10000.0	300.0	16.50	18.60	0.0400	96	97	6.00
119	12000.0	400.0	15.60	18.10	0.0370	90	96	6.00
120	16000.0	400.0	16.60	19.50	0.0370	96	98	6.00
121	20000.0	330.0	9.40	10.40	0.0400	98	100	6.00
122	11000.0	300.0	7.20	7.90	0.0350	100	101	6.00
123	6000.0	280.0	12.00	14.20	0.0350	98	99	6.00
124	7500.0	450.0	18.00	21.00	0.0350	43	99	6.00
125	14000.0	400.0	15.00	17.30	0.0400	99	101	6.00
126	17500.0	300.0	8.20	9.10	0.0350	101	102	6.00
127	5000.0	180.0	6.00	6.80	0.0400	102	103	6.00
128	6000.0	180.0	6.00	6.80	0.0400	22	103	6.00
129	6000.0	100.0	8.00	13.40	0.0350	25	104	6.00
130	6500.0	100.0	6.00	7.90	0.0330	104	105	6.00
133	8000.0	700.0	22.00	24.60	0.0300	7	113	6.00
134	12000.0	350.0	13.10	15.10	0.0350	9	113	6.00
135	4000.0	3000.0	3.30	3.40	0.0300	5	110	6.00
136	3000.0	1000.0	3.40	3.50	0.0300	110	111	6.00
137	16000.0	350.0	13.90	16.20	0.0350	5	111	6.00
138	11000.0	330.0	10.30	11.50	0.0400	111	112	6.00
139	26000.0	270.0	15.50	20.00	0.0380	112	113	6.00
140	13000.0	300.0	17.20	22.10	0.0400	113	114	6.00
141	9000.0	500.0	18.00	20.40	0.0350	113	113	6.00
142	14000.0	400.0	18.00	21.50	0.0400	113	116	6.00
143	8000.0	800.0	18.00	19.50	0.0350	12	116	6.00
144	7500.0	3000.0	5.00	5.10	0.0320	116	119	6.00
145	6300.0	3000.0	5.00	5.10	0.0320	115	119	6.00
146	4500.0	3000.0	5.00	5.10	0.0320	114	119	6.00
148	7800.0	3000.0	5.00	5.10	0.0320	117	119	6.00
149	10000.0	700.0	18.00	19.70	0.0400	116	117	6.00
150	18000.0	450.0	23.50	29.20	0.0380	116	125	6.00
151	12000.0	300.0	20.30	28.40	0.0400	117	124	6.00
152	7500.0	300.0	11.80	13.70	0.0400	117	118	6.00
153	13000.0	350.0	15.00	17.70	0.0400	114	118	6.00
154	10000.0	270.0	8.20	9.20	0.0400	118	121	6.00
155	7000.0	350.0	8.00	8.70	0.0400	112	121	6.00
156	8000.0	300.0	8.40	9.30	0.0400	121	122	6.00
157	11000.0	300.0	10.30	11.70	0.0450	123	126	6.00
158	13500.0	600.0	24.10	28.10	0.0400	124	126	6.00
159	10000.0	600.0	22.00	25.20	0.0400	124	125	6.00
160	13500.0	350.0	20.00	25.70	0.0400	125	128	6.00
161	8400.0	800.0	17.00	18.30	0.0350	41	127	6.00
162	8000.0	320.0	16.00	19.70	0.0350	42	127	6.00
163	9000.0	600.0	21.00	23.90	0.0400	127	128	6.00

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 5

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT CHANNEL DATA

CHANNEL	LENGTH, FT	WIDTH, FT	HYD RAD, FT	MAX DEP, FT	MANNINGS N	END JUNCTIONS	SIDE SLOPE	CRIT TIME, SE
164	15000.0	700.0	23.00	25.90	0.0370	128	129	6.00
165	6300.0	300.0	14.00	16.90	0.0330	20	136	6.00
166	7700.0	400.0	16.00	18.60	0.0330	135	136	6.00
167	15500.0	300.0	14.00	16.90	0.0330	129	135	6.00
168	12000.0	700.0	14.00	15.00	0.0370	129	131	6.00
169	19000.0	550.0	24.00	28.40	0.0400	126	130	6.00
170	7900.0	326.0	3.80	4.00	0.0380	130	131	6.00
174	11800.0	3375.0	7.70	7.80	0.0320	118	119	6.00
175	13000.0	390.0	16.10	17.70	0.0350	130	140	6.00
176	15000.0	540.0	18.00	20.30	0.0350	131	141	6.00
177	13500.0	360.0	13.00	14.90	0.0350	140	141	6.00
178	26000.0	350.0	17.00	20.70	0.0350	140	143	6.00
179	25000.0	300.0	13.70	16.40	0.0350	142	143	6.00
180	14400.0	370.0	14.00	16.20	0.0350	141	142	6.00
181	13500.0	300.0	16.90	21.60	0.0350	143	144	6.00
182	25000.0	230.0	7.00	7.80	0.0300	144	146	6.00
183	21500.0	420.0	11.00	12.10	0.0280	144	145	6.00
184	18500.0	370.0	10.00	11.00	0.0380	145	147	6.00
185	26000.0	175.0	4.00	4.40	0.0320	146	147	6.00
186	18000.0	180.0	11.00	14.00	0.0320	147	150	5.50
187	24900.0	220.0	5.10	5.50	0.0330	142	148	5.50
188	21000.0	100.0	4.80	5.70	0.0350	148	149	5.50
189	17700.0	45.0	5.50	8.18	0.0380	149	150	5.50
190	21100.0	180.0	8.20	9.70	0.0300	150	162	5.50
195	6000.0	250.0	10.00	11.70	0.0330	158	159	6.00
197	11300.0	186.0	8.90	10.80	0.0270	33	159	6.00
199	8500.0	174.0	5.00	5.60	0.0270	36	162	6.00
200	12500.0	375.0	4.00	4.20	0.0270	162	163	6.00

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 6

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT JUNCTION DATA

JUNCTION	AREA, FT ²	SLOPE, FT ² /FT	DEPTH, FT	MAX DEPTH, FT	X-CORD	Y-CORD	CHANNELS ENTERING JUNCTION
1	82700000.0	96000.0	28.90	29.50	0.34	7.73	1 59 0 0 0 0 0 0
2	87000000.0	138000.0	21.20	21.60	1.34	8.42	1 2 62 0 0 0 0 0
3	54500000.0	145300.0	23.70	24.60	1.70	7.34	59 3 2 0 0 0 0 0
4	47600000.0	102000.0	24.00	24.70	3.05	7.15	3 4 60 0 0 0 0 0
5	49800000.0	129300.0	18.00	18.50	4.12	7.47	4 135 137 5 0 0 0 0
6	32700000.0	59700.0	20.00	20.40	4.80	7.84	5 6 0 0 0 0 0 0
7	23400000.0	81900.0	22.00	23.00	5.40	8.44	6 7 133 0 0 0 0 0
8	25000000.0	120000.0	26.00	27.90	5.35	9.18	66 7 8 0 0 0 0 0
9	28300000.0	111000.0	28.00	29.80	6.14	9.29	8 9 134 0 0 0 0 0
10	25800000.0	73500.0	28.00	29.30	6.73	9.74	9 10 0 0 0 0 0 0
11	34300000.0	114000.0	18.00	18.60	7.81	9.53	95 10 11 0 0 0 0 0
12	22800000.0	105600.0	20.00	21.10	7.75	8.99	143 115 11 12 0 0 0 0
13	16000000.0	71800.0	20.00	21.00	8.39	8.47	13 32 12 0 0 0 0 0
14	10000000.0	79000.0	30.00	34.80	8.60	8.37	13 14 32 33 0 0 0 0
15	4500000.0	48300.0	30.00	37.60	9.20	8.32	14 15 34 0 0 0 0 0
16	5100000.0	85100.0	22.30	29.70	9.51	8.13	15 16 117 36 0 0 0 0
17	4400000.0	64600.0	21.80	27.30	9.85	7.89	16 17 37 39 0 0 0 0
18	5000000.0	85700.0	21.40	28.30	10.26	7.59	17 40 38 18 0 0 0 0
19	5400000.0	66600.0	19.80	23.10	10.62	7.18	18 19 46 0 0 0 0 0
20	5000000.0	79400.0	17.90	21.70	10.93	6.69	19 46 20 165 0 0 0 0
21	3590000.0	32500.0	20.80	23.30	11.35	6.64	20 21 0 0 0 0 0 0
22	3700000.0	52700.0	19.60	23.60	11.74	6.65	128 21 22 0 0 0 0 0
23	3060000.0	32100.0	20.40	23.30	12.12	6.44	22 23 0 0 0 0 0 0
24	2700000.0	34600.0	21.50	25.80	12.44	6.19	23 24 31 0 0 0 0 0
25	2700000.0	54250.0	21.30	30.90	12.70	5.88	24 25 129 44 0 0 0 0
26	2500000.0	33500.0	23.40	29.10	12.75	5.68	25 26 35 0 0 0 0 0
27	2150000.0	21700.0	21.80	25.00	13.21	5.53	26 27 0 0 0 0 0 0
28	1540000.0	18950.0	25.80	32.20	13.58	5.45	27 28 52 0 0 0 0 0
29	1320000.0	8250.0	29.70	33.20	13.79	5.46	28 29 0 0 0 0 0 0
30	2500000.0	9000.0	32.30	34.50	14.00	5.47	29 30 0 0 0 0 0 0
31	1500000.0	4500.0	20.00	20.70	14.27	5.50	30 0 0 0 0 0 0 0
32	1990000.0	69600.0	7.90	19.50	13.71	3.70	197 41 0 0 0 0 0 0
33	2260000.0	70440.0	6.80	7.80	13.70	3.05	41 42 0 0 0 0 0 0
34	2020000.0	63000.0	6.30	7.10	13.88	2.29	42 43 0 0 0 0 0 0
35	1690000.0	53760.0	5.50	6.10	14.19	1.72	43 199 0 0 0 0 0 0
36	850000.0	22500.0	7.00	7.90	12.49	5.67	44 45 0 0 0 0 0 0
37	570000.0	22500.0	7.00	8.40	12.33	5.45	45 47 0 0 0 0 0 0
38	570000.0	22500.0	7.00	8.40	12.64	5.25	47 48 0 0 0 0 0 0
39	570000.0	22500.0	7.00	8.40	12.89	5.07	48 49 0 0 0 0 0 0
40	900000.0	59400.0	20.00	21.60	8.97	7.98	33 34 161 0 0 0 0 0
41	5300000.0	73800.0	20.00	24.10	9.82	7.64	162 36 37 38 0 0 0 0
42	3900000.0	53400.0	16.00	18.30	10.10	7.93	39 40 124 0 0 0 0 0
43	750000.0	15000.0	10.00	11.30	13.46	5.28	52 53 0 0 0 0 0 0
44	910000.0	27750.0	9.00	10.80	13.32	3.16	49 53 54 0 0 0 0 0
45	750000.0	18000.0	9.00	10.30	13.51	3.03	54 55 0 0 0 0 0 0
46	900000.0	6000.0	8.00	8.30	12.86	6.30	31 0 0 0 0 0 0 0
47	1200000.0	7500.0	6.00	6.20	13.27	5.79	35 0 0 0 0 0 0 0
48	8200000.0	27000.0	11.00	11.10	2.75	7.85	61 60 0 0 0 0 0 0
49	5250000.0	114900.0	24.10	24.80	2.74	8.38	62 63 61 0 0 0 0 0
50	5020000.0	140700.0	25.60	26.60	3.94	9.15	63 64 65 0 0 0 0 0

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 7

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT JUNCTION DATA

ACTION	AREA, FT ²	SLOPE, FT ² /FT	DEPTH, FT	MAX DEPTH, FT	X-CORD	Y-CORD	CHANNELS ENTERING JUNCTION							
53	53300000.0	187800.0	23.40	24.50	4.70	9.83	64	67	66	65	0	0	0	0
54	39700000.0	84000.0	21.70	22.30	5.10	10.90	67	68	0	0	0	0	0	0
55	33000000.0	181500.0	23.00	24.70	5.60	11.97	68	69	85	76	0	0	0	0
56	29000000.0	291000.0	26.20	31.10	5.35	13.48	69	73	70	71	0	0	0	0
57	47000000.0	30000.0	22.00	22.20	4.88	14.39	70	0	0	0	0	0	0	0
58	26000000.0	318000.0	25.00	30.90	5.70	15.22	71	72	0	0	0	0	0	0
59	26000000.0	159000.0	25.00	27.30	5.89	16.42	72	0	0	0	0	0	0	0
61	3000000.0	78000.0	14.40	19.20	5.90	14.42	73	74	0	0	0	0	0	0
62	3400000.0	75000.0	11.50	13.60	6.09	15.21	74	75	0	0	0	0	0	0
63	2900000.0	108000.0	12.20	18.80	6.98	15.22	79	80	75	0	0	0	0	0
64	2200000.0	72000.0	13.60	20.50	7.11	15.89	80	81	0	0	0	0	0	0
65	76000000.0	72000.0	16.30	16.50	7.65	16.43	84	81	0	0	0	0	0	0
66	6200000.0	72000.0	9.70	10.40	6.47	12.38	76	77	0	0	0	0	0	0
67	5300000.0	72000.0	7.40	7.90	6.98	13.04	77	78	0	0	0	0	0	0
68	4400000.0	108000.0	8.40	9.60	7.13	14.21	78	82	79	0	0	0	0	0
69	2400000.0	72000.0	9.70	11.80	7.37	14.93	82	83	0	0	0	0	0	0
70	6000000.0	117000.0	16.10	20.10	7.74	15.78	91	84	83	0	0	0	0	0
71	6700000.0	79500.0	12.40	13.50	6.61	11.56	85	86	0	0	0	0	0	0
72	6000000.0	79500.0	11.70	12.80	7.40	11.97	86	87	0	0	0	0	0	0
73	6000000.0	81000.0	13.50	15.10	8.11	12.72	87	88	0	0	0	0	0	0
74	4800000.0	81000.0	15.60	18.50	8.06	13.70	88	89	0	0	0	0	0	0
75	5800000.0	160500.0	18.60	36.14	9.08	13.83	89	90	99	104	0	0	0	0
76	4400000.0	70000.0	21.60	32.30	8.65	14.84	90	91	0	0	0	0	0	0
80	20000000.0	235500.0	17.90	20.40	7.82	10.58	95	105	100	96	0	0	0	0
81	5000000.0	102000.0	19.30	26.50	7.42	11.13	96	97	0	0	0	0	0	0
82	2400000.0	102000.0	18.90	23.53	7.89	12.11	97	98	0	0	0	0	0	0
83	3200000.0	102000.0	17.60	31.37	8.57	13.00	98	99	0	0	0	0	0	0
84	3400000.0	90000.0	18.40	22.70	8.59	11.19	100	101	0	0	0	0	0	0
85	4400000.0	90000.0	17.60	23.10	8.88	12.03	101	102	0	0	0	0	0	0
86	4800000.0	85500.0	14.80	17.60	9.24	12.83	102	103	0	0	0	0	0	0
87	5400000.0	237300.0	10.50	16.50	9.53	13.77	103	111	109	110	104	0	0	0
88	12000000.0	45000.0	5.60	5.70	9.72	14.70	111	0	0	0	0	0	0	0
89	1200000.0	73800.0	7.50	11.80	10.20	14.44	110	0	0	0	0	0	0	0
90	13500000.0	159000.0	17.40	19.70	9.60	10.20	105	106	119	0	0	0	0	0
91	8100000.0	81000.0	17.80	19.80	9.43	10.93	106	107	0	0	0	0	0	0
92	7900000.0	79500.0	15.20	16.60	9.68	11.68	107	108	0	0	0	0	0	0
93	5000000.0	94500.0	13.40	15.80	9.96	12.53	108	109	0	0	0	0	0	0
95	12600000.0	72900.0	19.00	20.20	8.71	9.26	115	116	0	0	0	0	0	0
96	10000000.0	114000.0	16.30	18.20	9.71	9.30	118	119	120	0	0	0	0	0
97	8100000.0	96900.0	18.00	20.60	9.51	8.90	116	117	118	0	0	0	0	0
98	11000000.0	126000.0	14.10	15.50	10.57	8.81	120	121	123	0	0	0	0	0
99	9500000.0	82500.0	15.00	16.20	10.34	8.37	124	125	123	0	0	0	0	0
100	6600000.0	93000.0	8.70	9.40	11.58	9.23	121	122	0	0	0	0	0	0
101	13600000.0	127300.0	10.60	11.20	11.52	8.08	125	122	126	0	0	0	0	0
102	3400000.0	67500.0	7.80	8.60	12.32	7.21	126	127	0	0	0	0	0	0
103	1300000.0	33000.0	7.00	7.80	12.07	6.99	128	127	0	0	0	0	0	0
104	1500000.0	37500.0	7.00	7.80	13.18	6.05	129	130	0	0	0	0	0	0
105	1000000.0	19500.0	5.00	5.30	13.66	6.29	130	0	0	0	0	0	0	0
110	67000000.0	21000.0	3.40	3.50	4.70	6.80	135	136	0	0	0	0	0	0
111	6800000.0	90000.0	9.40	10.10	9.34	7.10	137	138	136	0	0	0	0	0

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 8

BAY FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

INVARIANT JUNCTION DATA

JUNCTION	AREA, FT ²	SLOPE, FT ² /FT	DEPTH, FT	MAX DEPTH, FT	X-CORD	Y-CORD	CHANNELS ENTERING JUNCTION
112	8900000.0	132000.0	12.70	14.20	6.28	7.05	138 139 155 0 0 0 0 0
113	21800000.0	204000.0	17.60	19.40	6.06	8.28	133 134 141 139 140 0 0 0
114	13000000.0	91500.0	11.80	12.40	6.31	7.99	140 153 146 0 0 0 0 0
115	18000000.0	87900.0	12.30	12.70	6.71	8.20	141 142 145 0 0 0 0 0
116	34000000.0	172500.0	12.80	13.30	7.69	8.30	143 150 142 149 144 0 0 0
117	18000000.0	111900.0	10.10	10.50	7.60	7.70	152 151 149 148 0 0 0 0
118	26000000.0	124600.0	9.00	9.30	7.18	7.30	154 152 153 174 0 0 0 0
119	68000000.0	-113700.0	7.70	7.80	7.21	8.08	148 144 145 146 174 0 0 0
121	5450000.0	75000.0	9.00	9.70	6.76	6.87	155 154 156 0 0 0 0 0
122	1300000.0	24000.0	9.60	10.70	6.80	6.18	156 0 0 0 0 0 0 0
123	14000000.0	33000.0	9.60	11.10	6.81	6.00	157 0 0 0 0 0 0 0
124	14000000.0	106500.0	20.50	22.50	7.80	6.80	151 159 158 0 0 0 0 0
125	12000000.0	124500.0	21.30	24.40	8.34	7.10	150 159 160 0 0 0 0 0
126	17400000.0	130500.0	18.10	19.60	7.83	5.99	158 169 157 0 0 0 0 0
127	9000000.0	76200.0	27.20	31.40	9.22	7.38	162 161 163 0 0 0 0 0
128	9300000.0	112500.0	22.30	26.60	9.36	6.74	160 163 164 0 0 0 0 0
129	15400000.0	127500.0	18.60	20.40	9.04	5.90	164 168 167 0 0 0 0 0
130	15300000.0	119700.0	17.80	19.30	8.23	4.99	169 170 175 0 0 0 0 0
131	12500000.0	104700.0	17.80	19.40	8.96	4.99	168 176 170 0 0 0 0 0
133	9400000.0	69600.0	14.40	15.30	10.24	5.94	167 166 0 0 0 0 0 0
136	2500000.0	42000.0	17.00	20.60	10.31	6.44	165 166 0 0 0 0 0 0
140	15500000.0	157500.0	14.10	15.30	8.20	4.20	175 177 178 0 0 0 0 0
141	9600000.0	128700.0	14.80	16.70	9.38	4.18	176 177 180 0 0 0 0 0
142	8600000.0	186675.0	10.80	12.50	9.99	3.50	180 179 187 0 0 0 0 0
143	21600000.0	193500.0	15.70	17.00	8.24	2.50	178 179 181 51 0 0 0 0
144	11700000.0	180000.0	12.50	14.10	8.50	1.40	181 182 183 0 0 0 0 0
145	4800000.0	120000.0	11.90	14.60	10.15	1.43	183 184 0 0 0 0 0 0
146	3800000.0	153000.0	8.90	11.70	10.09	0.30	182 185 0 0 0 0 0 0
147	8200000.0	183000.0	10.20	11.80	11.66	1.10	184 186 185 0 0 0 0 0
148	3600000.0	126225.0	5.40	6.10	11.89	3.47	187 188 0 0 0 0 0 0
149	1900000.0	106425.0	4.00	4.60	12.66	2.70	188 189 0 0 0 0 0 0
150	4300000.0	156200.0	9.50	12.30	12.66	1.56	189 186 190 0 0 0 0 0
151	101000000.0	35000.0	10.00	10.10	7.51	1.74	51 0 0 0 0 0 0 0
158	1300000.0	27000.0	9.00	10.10	13.70	4.85	55 196 0 0 0 0 0 0
159	1500000.0	51900.0	9.00	11.20	13.88	4.47	196 197 0 0 0 0 0 0
162	4200000.0	121025.0	9.30	11.10	13.82	1.19	190 199 200 0 0 0 0 0
163	12000000.0	37500.0	2.50	2.60	14.30	0.51	200* 0 0 0 0 0 0 0

-- * INDICATES THE CHANNEL MAY DRAIN ADJOINING NODE AT ANTICIPATED TIDAL STAGE

** INDICATES NEGATIVE VOLUME IS POSSIBLE WITH ANTICIPATED TIDAL STAGE

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 9

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
HYDRODYNAMIC CALIBRATION .. CONDITION #1

TIDAL COEFFICIENTS FOR JUNCTION 1
1. 5811 -0. 8065 -0. 3646 -0. 0303 0. 1438 1. 2200 -0. 1562

TIME	OBSERVED	COMPUTED	DIFF
-1. 6000	3. 1300	3. 1084	-0. 0216
6. 1500	-0. 4200	-0. 4063	0. 0137
11. 9000	2. 7900	2. 8071	0. 0171
17. 1500	0. 9700	0. 9573	-0. 0127
22. 4000	3. 1300	3. 1084	-0. 0216
30. 1500	-0. 4200	-0. 4063	0. 0137
0. 3375	2. 6099	2. 6314	0. 0215
2. 2750	1. 3550	1. 3650	0. 0100
4. 2125	0. 1001	0. 0681	-0. 0320
7. 5875	0. 0503	0. 0939	0. 0436
9. 0250	1. 1850	1. 1627	-0. 0223
10. 4625	2. 3197	2. 2685	-0. 0513
13. 2125	2. 5234	2. 5776	0. 0542
14. 5250	1. 8800	1. 8749	-0. 0051
15. 8375	1. 2366	1. 1854	-0. 0512
18. 4625	1. 2864	1. 3292	0. 0428
19. 7750	2. 0500	2. 0771	0. 0271
21. 0875	2. 8136	2. 7878	-0. 0258
24. 3375	2. 6099	2. 6314	0. 0215
26. 2750	1. 3550	1. 3650	0. 0100
28. 2125	0. 1001	0. 0681	-0. 0319
TOTAL			
0. 5507			

COMPUTED TIDE BY HOUR

0	2.79	1	2.25	2	1.57	3	0.84	4	0.18	5	-0.27	6	-0.42	7	-0.20	8	0.36
9	1.14	10	1.95	11	2.56	12	2.81	13	2.66	14	2.18	15	1.60	16	1.13	17	0.93
18	1.14	19	1.61	20	2.21	21	2.75	22	3.07	23	3.08	24	2.79				

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 10

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
HYDRODYNAMIC CALIBRATION .. CONDITION #1

EVAPORATION

JUNCTION TO JUNCTION	RATE, IN/MO
1 163	0.00
151 151	10.00

CHANNEL DEPLETIONS

LOWLANDS = 1372.
UPLANDS = 877.

JUNCTION	INFLOW, CFS	WITHDRAWL, CFS	JUNCTION	INFLOW, CFS	WITHDRAWL, CFS
4	0.00	25.13	5	0.00	15.37
7	0.00	8.57	8	0.00	8.57
9	0.00	8.57	10	0.00	5.30
11	0.00	4.86	12	0.00	4.86
13	0.00	1.77	14	0.00	2.34
15	0.00	1.77	16	0.00	3.09
17	0.00	3.09	18	0.00	3.09
19	0.00	3.09	20	0.00	5.30
21	0.00	5.30	22	0.00	5.30
23	0.00	4.99	24	0.00	6.63
25	0.00	6.63	26	0.00	7.80
27	0.00	6.63	28	0.00	1.41
33	0.00	28.57	40	0.00	1.37
45	0.00	1.41	51	0.00	16.40
52	0.00	9.49	53	0.00	8.75
54	0.00	15.46	55	0.00	14.17
56	0.00	22.29	57	0.00	155.69
58	0.00	113.41	59	0.00	88.02
61	0.00	8.13	62	0.00	7.86
63	0.00	6.58	64	0.00	19.57
65	16300.00	181.51	66	0.00	8.84
67	0.00	18.87	68	0.00	12.15
69	0.00	6.80	70	0.00	16.92
71	0.00	14.85	72	0.00	4.82
73	0.00	6.36	74	0.00	10.38
75	0.00	6.58	76	0.00	34.42
80	0.00	15.60	81	0.00	7.56
82	0.00	9.99	83	0.00	5.92
84	0.00	10.65	85	0.00	8.48
86	0.00	7.51	87	0.00	10.56
88	0.00	24.77	89	BB6.00	31.47
90	0.00	17.61	91	0.00	24.48
92	0.00	21.66	93	0.00	37.02
95	0.00	3.84	96	0.00	25.73
97	0.00	3.84	98	0.00	6.05
99	0.00	4.42	100	0.00	27.96
101	0.00	22.53	102	0.00	31.37
110	0.00	23.26	111	0.00	8.71
112	0.00	13.36	113	0.00	8.26
114	0.00	3.49	115	0.00	2.47
116	0.00	4.37	117	0.00	6.58
118	0.00	2.30	121	0.00	7.95
123	0.00	167.11	124	0.00	6.49
125	0.00	3.89	126	0.00	33.47
127	0.00	7.51	128	0.00	10.21
129	0.00	10.65	130	0.00	6.19
131	0.00	5.88	135	0.00	43.43
140	0.00	56.67	141	0.00	15.91
142	0.00	38.40	143	0.00	45.21
144	0.00	3245.87	145	0.00	22.89
146	0.00	84.39	147	0.00	99.07
148	0.00	30.05	149	0.00	19.71
150	0.00	23.95	151	0.00	1660.00
158	45.00	10.72	159	0.00	10.79
162	0.00	24.31	163	3000.00	120.30
M.R. PUMPING REDUCED	0.000 M.R. PUMPING INPUT		270.315 M.R. ACTUAL PUMPING	270.315	

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 11

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
HYDRODYNAMIC CALIBRATION .. CONDITION #1

HOUR	JUNCTION 2 HEAD(FEET)	JUNCTION 12 HEAD(FEET)	JUNCTION 25 HEAD(FEET)	JUNCTION 55 HEAD(FEET)	JUNCTION 151 HEAD(FEET)	JUNCTION 143 HEAD(FEET)
1. 00	2.38	3.18	3.30	3.01	0.77	2.76
2. 00	1.76	2.97	3.41	2.39	0.71	3.24
3. 00	1.10	2.52	2.86	1.82	0.65	3.28
4. 00	0.45	1.99	2.15	1.23	0.90	2.20
5. 00	-0.08	1.41	1.66	0.63	1.27	1.52
6. 00	-0.36	0.84	1.07	0.11	1.43	1.37
7. 00	-0.27	0.35	0.49	-0.21	1.37	0.90
8. 00	0.21	0.03	0.09	-0.26	1.31	0.44
9. 00	0.99	-0.06	-0.20	0.26	1.25	-0.02
10. 00	1.76	0.33	-0.21	1.07	1.18	-0.33
11. 00	2.43	0.88	0.50	1.86	1.12	-0.15
12. 00	2.77	1.54	1.33	2.54	1.06	0.43
13. 00	2.68	2.17	1.97	2.95	1.00	1.02
14. 00	2.26	2.59	2.57	2.87	0.94	1.70
15. 00	1.81	2.69	2.95 - L H	2.31	0.88	2.35
16. 00	1.31	2.38	2.83	1.83	0.82	2.78
17. 00	1.01	1.97	2.13	1.35	0.79	2.53
18. 00	1.04	1.52	1.62	1.00	1.15	1.62
19. 00	1.45	1.16	1.23	0.96	1.39	1.39
20. 00	2.05	1.06	0.86 - H L	1.51	1.34	1.02
21. 00	2.61	1.46	0.94	2.18	1.28	0.84
22. 00	3.01	1.96	1.72	2.76	1.22	1.08
23. 00	3.12	2.53	2.43	3.18	1.16	1.63
24. 00	2.91	2.99	2.93	3.35	1.10	2.21
25. 00	2.38	3.20	3.33	3.01	1.04	2.83
26. 00	1.76	2.98	3.42 - H H	2.40	0.98	3.28
27. 00	1.10	2.52	2.86	1.83	0.92	3.28
28. 00	0.45	1.99	2.15	1.23	1.18	2.21
29. 00	-0.08	1.41	1.66	0.63	1.55	1.52
30. 00	-0.36	0.84	1.07	0.12	1.59	1.37
31. 00	-0.27	0.37	0.51	-0.21	1.53	0.92
32. 00	0.21	0.04	0.11	-0.25	1.46	0.45
33. 00	0.99	-0.05	-0.20	0.26	1.40	-0.01
34. 00	1.76	0.33	-0.21	1.07	1.34	-0.32
35. 00	2.43	0.88	0.50	1.86	1.28	-0.15
36. 00	2.77	1.54	1.33	2.54	1.22	0.44
37. 00	2.68	2.17	1.97	2.95	1.16	1.02
38. 00	2.26	2.59	2.57	2.87	1.10	1.70
39. 00	1.81	2.69	2.96	2.31	1.04	2.35
40. 00	1.31	2.38	2.83	1.83	0.98	2.78
41. 00	1.01	1.97	2.13	1.35	0.95	2.53
42. 00	1.04	1.52	1.62	1.00	1.31	1.62
43. 00	1.45	1.16	1.23	0.96	1.49	1.45
44. 00	2.05	1.07	0.86	1.51	1.43	1.04
45. 00	2.61	1.47	0.95	2.18	1.37	0.83
46. 00	3.01	1.97	1.72	2.77	1.31	1.07
47. 00	3.12	2.53	2.43	3.18	1.24	1.63
48. 00	2.91	2.99	2.93	3.35	1.18	2.21

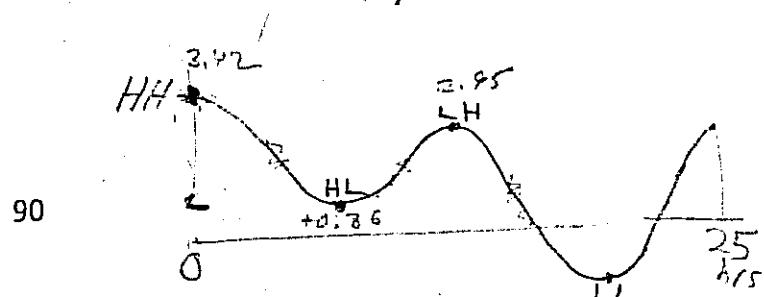


FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 12

SAN FRANCISCO DELTA INLAND FROM ANTIOCH -- MODEL DEMONSTRATION
HYDRODYNAMIC CALIBRATION .. CONDITION #1

HOUR	CHANNEL 8 FLOW (CFS)	CHANNEL 15 FLOW (CFS)	CHANNEL 21 FLOW (CFS)	CHANNEL 27 FLOW (CFS)	CHANNEL 31 FLOW (CFS)	CHANNEL 34 FLOW (CFS)
	VEL. (FPS)	VEL. (FPS)	VEL. (FPS)	VEL. (FPS)	VEL. (FPS)	VEL. (FPS)
1.00	35451. 0.56	12720. 0.32	5056. 0.31	2564. 0.19	0. 0.00	2112. 0.63
2.00	-27338. -0.44	-1583. -0.07	-313. -0.02	765. 0.05	0. 0.00	1335. 0.39
3.00	-75515. -1.23	-16945. -0.70	-8730. -0.54	-3151. -0.24	0. 0.00	-1286. -0.40
4.00	-93035. -1.54	-19191. -0.81	-8099. -0.52	-3853. -0.30	12000. 1.11	-2998. -0.97
5.00	-95338. -1.60	-20913. -0.90	-8190. -0.54	-3738. -0.29	12000. 1.12	-2984. -1.01
6.00	-90829. -1.55	-21517. -0.74	-8857. -0.60	-4035. -0.32	769. 0.07	-3126. -1.11
7.00	-80417. -1.39	-19698. -0.87	-7873. -0.54	-3843. -0.32	0. 0.00	-3049. -1.14
8.00	-62321. -1.08	-16761. -0.75	-6207. -0.44	-3213. -0.27	0. 0.00	-2673. -1.05
9.00	-23107. -0.39	-11362. -0.51	-4429. -0.32	-2592. -0.22	0. 0.00	-2464. -0.99
10.00	43639. 0.75	4511. 0.21	743. 0.06	-1063. -0.09	0. 0.00	-1954. -0.80
11.00	90389. 1.51	19151. 0.84	8935. 0.62	2531. 0.21	0. 0.00	34. 0.02
12.00	104303. 1.71	23007. 0.99	8117. 0.54	2806. 0.22	0. 0.00	1198. 0.42
13.00	96439. 1.55	23128. 0.98	7883. 0.49	2905. 0.23	0. 0.00	1581. 0.53
14.00	68710. 1.10	19569. 0.81	7288. 0.46	3184. 0.24	0. 0.00	2193. 0.70
15.00	17290. 0.27	7510. 0.39	3828. 0.23	2175. 0.16	0. 0.00	2016. 0.62
16.00	-41696. -0.68	-8586. -0.36	-3843. -0.24	-574. -0.04	0. 0.00	695. 0.21
17.00	-72959. -1.21	-16332. -0.69	-8501. -0.54	-3456. -0.27	12000. 1.11	-1970. -0.64
18.00	-75666. -1.26	-16216. -0.69	-6043. -0.40	-3081. -0.24	12000. 1.12	-2633. -0.90
19.00	-58391. -0.98	-15415. -0.67	-7079. -0.47	-3406. -0.27	1658. 0.16	-2647. -0.93
20.00	-16267. -0.27	-9581. -0.42	-4975. -0.34	-2812. -0.23	0. 0.00	-2533. -0.92
21.00	46920. 0.78	7844. 0.34	2830. 0.19	-194. -0.01	0. 0.00	-1633. -0.60
22.00	84536. 1.37	19153. 0.81	9050. 0.59	2845. 0.22	0. 0.00	561. 0.20
23.00	88631. 1.42	19794. 0.82	6995. 0.44	2641. 0.20	0. 0.00	1475. 0.47
24.00	71147. 1.13	17809. 0.73	6330. 0.39	2671. 0.20	0. 0.00	1788. 0.55
25.00	33130. 0.52	12166. 0.49	4844. 0.29	2458. 0.18	0. 0.00	2019. 0.60
26.00	-29749. -0.48	-2376. -0.10	-632. -0.04	638. 0.05	0. 0.00	1243. 0.36
27.00	-76592. -1.25	-17129. -0.71	-8868. -0.55	-3266. -0.24	0. 0.00	-1439. -0.44
28.00	-93261. -1.54	-19246. -0.81	-8049. -0.51	-3851. -0.30	12000. 1.11	-3028. -0.98
29.00	-95394. -1.60	-20977. -0.90	-8310. -0.54	-3788. -0.30	11461. 1.06	-2997. -1.01
30.00	-90824. -1.55	-21528. -0.94	-8869. -0.60	-4042. -0.32	0. 0.00	-3127. -1.11
31.00	-80742. -1.40	-19786. -0.88	-7359. -0.51	-3649. -0.30	0. 0.00	-3026. -1.13
32.00	-62836. -1.09	-16935. -0.76	-6432. -0.45	-3303. -0.28	0. 0.00	-2731. -1.06
33.00	-23825. -0.41	-11536. -0.52	-4521. -0.32	-2634. -0.22	0. 0.00	-2476. -1.00
34.00	43042. 0.74	4248. 0.20	669. 0.05	-1076. -0.09	0. 0.00	-1963. -0.80
35.00	90177. 1.31	19087. 0.84	8933. 0.62	2527. 0.21	0. 0.00	12. 0.01
36.00	104246. 1.71	22994. 0.99	8131. 0.54	2807. 0.22	0. 0.00	1195. 0.42
37.00	96398. 1.55	23109. 0.97	7672. 0.49	2898. 0.22	0. 0.00	1576. 0.53
38.00	68671. 1.10	19548. 0.81	7277. 0.45	3178. 0.24	0. 0.00	2188. 0.70
39.00	17251. 0.27	9501. 0.39	3825. 0.23	2173. 0.16	0. 0.00	2014. 0.62
40.00	-41725. -0.69	-8594. -0.36	-3847. -0.24	-576. -0.04	0. 0.00	693. 0.21
41.00	-72989. -1.21	-16335. -0.69	-8504. -0.54	-3458. -0.27	12000. 1.10	-1972. -0.64
42.00	-75667. -1.26	-16218. -0.69	-6063. -0.40	-3081. -0.24	12000. 1.12	-2633. -0.90
43.00	-58398. -0.98	-15417. -0.67	-7080. -0.47	-3405. -0.27	892. 0.08	-2647. -0.93
44.00	-16350. -0.27	-9445. -0.41	-4737. -0.32	-2769. -0.22	0. 0.00	-2530. -0.92
45.00	46229. 0.76	7816. 0.34	2531. 0.17	-353. -0.03	0. 0.00	-1623. -0.59
46.00	84199. 1.36	19002. 0.81	8975. 0.59	2838. 0.22	0. 0.00	564. 0.20
47.00	88443. 1.41	19688. 0.82	7019. 0.44	2673. 0.20	0. 0.00	1476. 0.47
48.00	71044. 1.12	17767. 0.73	6334. 0.39	2673. 0.20	0. 0.00	1787. 0.55

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 13

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
HYDRODYNAMIC CALIBRATION .. CONDITION #1

NODE...	MEAN,	MIN,	MAX	AND RANGE IN W. B.	ELEV...	WATER BALANCE...	VOLUME
1	1.58	-0.44	3.15	3.59	12853.0	2.5200E+09	
2	1.60	-0.37	3.12	3.49	-0.1	1.9830E+09	
3	1.62	-0.24	3.06	3.30	0.1	1.3794E+09	
4	1.63	-0.21	3.06	3.27	0.0	1.2195E+09	
5	1.63	-0.14	3.04	3.18	0.3	9.7819E+08	
6	1.66	-0.07	3.03	3.10	0.2	7.0803E+08	
7	1.67	-0.06	3.05	3.11	0.1	5.5361E+08	
8	1.67	-0.04	3.06	3.10	0.7	6.9161E+08	
9	1.68	-0.04	3.09	3.13	0.2	8.3966E+08	
10	1.69	-0.04	3.13	3.17	0.1	7.6566E+08	
11	1.69	-0.05	3.18	3.23	0.2	6.7519E+08	
12	1.69	-0.07	3.20	3.27	0.3	4.9441E+08	
13	1.69	-0.09	3.23	3.32	0.2	3.4693E+08	
14	1.69	-0.11	3.25	3.36	0.1	3.1679E+08	
15	1.69	-0.12	3.28	3.40	0.2	1.4256E+08	
16	1.69	-0.14	3.30	3.44	0.1	1.2233E+08	
17	1.69	-0.16	3.32	3.47	0.1	1.0333E+08	
18	1.69	-0.17	3.33	3.50	0.2	1.1543E+08	
19	1.69	-0.19	3.35	3.54	0.1	1.1603E+08	
20	1.69	-0.20	3.37	3.58	0.2	9.7930E+07	
21	1.69	-0.22	3.39	3.61	0.1	8.0721E+07	
22	1.69	-0.23	3.41	3.64	0.1	7.8760E+07	
23	1.69	-0.24	3.42	3.66	0.1	6.7590E+07	
24	1.70	-0.25	3.43	3.69	0.0	6.2615E+07	
25	1.70	-0.27	3.45	3.71	0.0	6.207BE+07	
26	1.70	-0.27	3.45	3.72	0.0	6.2730E+07	
27	1.70	-0.28	3.46	3.73	0.0	5.0507E+07	
28	1.70	-0.28	3.46	3.74	0.0	4.2334E+07	
29	1.70	-0.28	3.46	3.75	0.0	4.1432E+07	
30	1.70	-0.28	3.47	3.75	0.0	8.4969E+07	
31	1.70	-0.28	3.47	3.75	0.0	3.2539E+07	
33	1.92	0.13	3.48	3.34	0.1	1.9533E+07	
34	2.04	0.43	3.50	3.07	0.0	2.0017E+07	
35	2.24	0.78	3.56	2.78	0.1	1.7237E+07	
36	2.36	1.00	3.64	2.63	0.0	1.3281E+07	
37	1.71	-0.26	3.45	3.71	0.0	7.4003E+06	
38	1.72	-0.25	3.46	3.71	0.0	4.9676E+06	
39	1.73	-0.24	3.46	3.70	0.0	4.9721E+06	
40	1.73	-0.23	3.47	3.69	0.0	4.9758E+06	
41	1.69	-0.12	3.27	3.39	0.1	1.9515E+08	
42	1.69	-0.15	3.31	3.47	0.0	1.1493E+08	
43	1.69	-0.17	3.33	3.49	0.1	6.8979E+07	
44	1.72	-0.24	3.47	3.71	0.0	8.7862E+06	
45	1.74	-0.21	3.47	3.68	0.0	9.7680E+06	
46	1.76	-0.18	3.47	3.65	0.0	8.0651E+06	
48	1.70	-0.26	3.44	3.69	0.0	8.7240E+06	
49	1.70	-0.27	3.45	3.73	0.0	9.2345E+06	
50	1.62	-0.28	3.13	3.41	0.4	1.0349E+09	
51	1.62	-0.31	3.13	3.45	0.1	1.3499E+09	
52	1.64	-0.28	3.18	3.45	0.1	1.3672E+09	
53	1.65	-0.27	3.22	3.49	-0.5	1.3350E+09	
54	1.68	-0.27	3.29	3.56	0.1	9.2776E+08	
55	1.70	-0.28	3.35	3.63	0.1	8.1479E+08	
56	1.70	-0.37	3.47	3.85	0.0	8.0894E+08	
57	1.70	-0.40	3.51	3.91	-0.3	1.1609E+09	
58	1.69	-0.58	3.64	4.23	0.4	6.9370E+08	
59	1.69	-0.70	3.74	4.45	0.8	6.9364E+08	
61	1.69	0.02	3.49	3.47	0.0	4.8845E+07	
62	2.26	0.82	3.54	2.72	0.0	4.6770E+07	
63	2.54	1.36	3.60	2.24	0.2	4.2726E+07	
64	2.77	1.73	3.71	1.98	0.1	3.6010E+07	
65	3.21	2.24	4.04	1.81	2.3	1.4820E+09	
66	1.81	-0.06	3.39	3.45	0.0	7.1365E+07	
67	2.03	0.39	3.44	3.05	0.0	4.9985E+07	
68	2.42	1.18	3.50	2.32	-0.1	4.7585E+07	
69	2.54	1.35	3.58	2.23	0.0	2.9377E+07	
70	2.91	1.87	3.82	1.96	0.0	1.1404E+09	

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT . . . PAGE 14

71	1.81	-0.02	3.37	3.39	0.0	9.5207E+07
72	2.04	0.51	3.39	2.88	0.0	8.2442E+07
73	2.18	0.76	3.43	2.66	0.0	9.4071E+07
74	2.33	1.01	3.50	2.49	0.0	8.6057E+07
75	2.42	1.10	3.56	2.47	0.7	1.2186E+08
76	2.64	1.45	3.67	2.22	-1.0	1.0661E+08
80	1.78	0.01	3.26	3.25	0.0	3.9339E+08
81	1.95	0.29	3.37	3.08	0.0	1.0620E+08
82	2.04	0.44	3.42	2.98	0.0	5.0249E+07
83	2.22	0.74	3.49	2.75	-0.3	6.3395E+07
84	1.81	0.05	3.30	3.26	0.0	1.0911E+08
85	1.87	0.13	3.34	3.21	0.1	8.5627E+07
86	1.99	0.35	3.39	3.03	0.1	8.0568E+07
87	2.16	0.69	3.44	2.75	-0.2	6.8368E+07
88	2.13	0.84	3.38	2.54	0.6	9.2700E+07
89	2.86	1.73	3.90	2.17	0.0	1.2428E+07
90	1.74	-0.07	3.33	3.40	0.2	2.5834E+08
91	1.75	-0.09	3.36	3.46	0.1	1.5832E+08
92	1.77	-0.11	3.39	3.49	0.1	1.3403E+08
93	1.80	-0.08	3.40	3.48	0.0	7.3964E+07
95	1.69	-0.09	3.24	3.33	0.0	2.6065E+08
96	1.72	-0.14	3.32	3.46	0.0	1.8010E+08
97	1.70	-0.13	3.29	3.42	-0.2	1.5948E+08
98	1.70	-0.18	3.36	3.54	0.0	1.7378E+08
99	1.70	-0.19	3.35	3.54	0.0	1.5857E+08
100	1.70	-0.23	3.39	3.62	-0.1	6.8589E+07
101	1.69	-0.23	3.39	3.62	0.1	1.6715E+08
102	1.69	-0.25	3.42	3.67	0.1	3.2267E+07
103	1.69	-0.25	3.42	3.66	0.0	1.1297E+07
104	1.69	-0.29	3.47	3.75	0.0	1.3038E+07
105	1.69	-0.30	3.48	3.78	0.0	6.6919E+04
110	1.65	-0.15	3.05	3.21	0.3	3.3816E+08
111	1.65	-0.15	3.05	3.20	0.0	7.5127E+07
112	1.67	-0.08	3.06	3.13	0.0	1.2788E+08
113	1.67	-0.05	3.08	3.13	0.1	4.2005E+08
114	1.68	-0.07	3.18	3.25	0.2	1.7515E+08
115	1.68	-0.05	3.16	3.21	0.2	2.5155E+08
116	1.68	-0.09	3.20	3.28	0.4	4.9216E+08
117	1.68	-0.10	3.20	3.30	0.3	2.1194E+08
118	1.68	-0.09	3.19	3.28	0.3	2.7754E+08
119	1.68	-0.09	3.19	3.27	0.5	6.3748E+08
121	1.68	-0.06	3.09	3.15	0.0	5.8174E+07
122	1.68	-0.06	3.10	3.16	0.0	1.4656E+07
123	1.64	-0.19	3.28	3.47	0.0	1.5730E+07
124	1.66	-0.14	3.25	3.39	0.1	3.1010E+08
125	1.66	-0.13	3.24	3.38	-0.1	2.7548E+08
126	1.64	-0.18	3.28	3.46	0.2	3.4337E+08
127	1.68	-0.14	3.29	3.43	0.1	2.5989E+08
128	1.67	-0.16	3.29	3.45	0.0	2.2286E+08
129	1.66	-0.20	3.33	3.53	0.2	3.1192E+08
130	1.62	-0.23	3.32	3.55	0.3	2.9703E+08
131	1.63	-0.22	3.33	3.55	0.0	2.4277E+08
135	1.68	-0.22	3.37	3.60	0.3	1.5106E+08
136	1.68	-0.21	3.37	3.58	0.0	4.6688E+07
140	1.60	-0.27	3.35	3.61	0.2	2.1327E+08
141	1.60	-0.26	3.35	3.61	-0.1	1.5741E+08
142	1.56	-0.30	3.36	3.65	-0.2	1.0625E+08
143	1.49	-0.36	3.37	3.73	-0.5	3.7127E+08
144	1.43	-0.43	3.40	3.83	0.1	1.6298E+08
145	1.51	-0.34	3.48	3.83	-0.1	6.4371E+07
146	1.49	-0.46	3.48	3.94	-0.2	3.9471E+07
147	1.67	-0.12	3.55	3.67	0.2	9.7292E+07
148	1.63	-0.11	3.43	3.54	-0.1	2.5287E+07
149	1.77	0.10	3.53	3.43	0.0	1.0960E+07
150	1.94	0.32	3.63	3.32	0.2	4.9188E+07
151	1.25	0.90	1.61	0.71	102.9	1.1361E+09
158	1.77	-0.15	3.47	3.62	0.0	1.4003E+07
159	1.81	-0.08	3.47	3.55	-0.1	1.6213E+07
162	2.52	1.28	3.75	2.47	0.1	4.9646E+07
163	3.03	2.18	4.00	1.82	0.0	6.6327E+07

FIGURE VI-3 (Cont.)

LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 15

CHANNEL...	MEAN, MIN AND MAX FLOW...	MEAN, MIN AND MAX VELOCITY...	MAXIMUM GRAD...	HOURS DRY
1	-8995.3 -204665.3	212462.2 -0.13	-2.25 0.01856	0.00
2	-456.4 -65290.6	70692.8 -0.05	-1.37 0.01851	0.00
3	-4314.1 -139880.2	145263.6 -0.09	-1.97 0.01263	0.00
4	-3908.8 -128694.8	136282.7 -0.10	-1.97 0.01977	0.00
5	-3786.9 -105544.5	112469.1 -0.10	-1.81 0.01946	0.00
6	-3787.2 -100418.2	107844.1 -0.09	-1.73 0.01274	0.00
7	-2834.6 -65304.5	69766.6 -0.08	-1.42 0.01130	0.00
8	-3078.8 -95600.2	104363.5 -0.07	-1.60 0.01143	0.00
9	-3463.4 -92263.8	100881.3 -0.08	-1.61 0.01313	0.00
10	-3468.7 -88145.3	96552.8 -0.08	-1.53 0.01245	0.00
11	1517.7 -65948.5	80377.8 0.02	-1.34 0.01339	0.00
12	23.1 -37445.6	44878.6 -0.01	-1.07 0.01242	0.00
13	-198.9 -18686.2	21984.3 -0.02	-1.01 0.01000	0.00
14	-667.3 -15962.5	18277.3 -0.04	-0.94 0.00959	0.00
15	-861.9 -21563.2	23279.3 -0.04	-0.94 0.00889	0.00
16	46.2 -15636.5	18557.9 -0.01	-0.88 0.00916	0.00
17	212.9 -8128.1	9833.3 0.01	-0.65 0.00622	0.00
18	101.9 -12737.2	14835.2 0.00	-0.65 0.00739	0.00
19	102.9 -9791.9	11448.2 0.00	-0.63 0.00697	0.00
20	-690.6 -10082.4	10026.7 -0.05	-0.61 0.00691	0.00
21	-695.9 -9429.1	9218.0 -0.05	-0.60 0.00697	0.00
22	-695.8 -8538.7	7916.3 -0.05	-0.53 0.00599	0.00
23	-700.8 -7942.3	7184.8 -0.06	-0.60 0.00683	0.00
24	-707.5 -7219.0	6300.9 -0.06	-0.51 0.00585	0.00
25	-579.9 -5246.0	4387.0 -0.04	-0.33 0.00356	0.00
26	-587.7 -4525.1	3544.6 -0.04	-0.29 0.00298	0.00
27	-594.4 -4157.6	3192.1 -0.05	-0.33 0.00327	0.00
28	0.0 -1265.6	1447.9 0.00	-0.08 0.00110	0.00
29	0.0 -953.0	1090.0 0.00	-0.04 0.00085	0.00
30	0.0 -357.9	409.2 0.00	-0.05 0.00066	0.00
31	0.0 -197.2	227.6 0.00	-0.06 0.00097	0.00
32	220.0 -16717.7	20255.3 0.00	-0.54 0.00473	0.00
33	685.9 -17479.3	21852.1 0.02	-0.53 0.00493	0.00
34	192.7 -6373.9	6338.3 0.02	-0.41 0.00331	0.00
35	0.0 -276.9	319.2 0.00	-0.07 0.00127	0.00
36	225.2 -4948.1	6312.0 0.02	-0.45 0.00552	0.00
37	263.8 -656.8	1349.6 0.06	-0.19 0.00349	0.00
38	405.4 -5774.9	5799.6 0.04	-0.64 0.00699	0.00
39	-433.7 -7015.2	7560.8 -0.04	-0.62 0.00864	0.00
40	-297.7 -1533.3	1149.5 -0.04	-0.21 0.00190	0.00
41	-737.8 -2362.6	1520.3 -0.43	-1.25 0.03486	0.00
42	-737.8 -2113.8	1261.8 -0.51	-1.32 0.04066	0.00
43	-737.9 -1899.6	1028.3 -0.49	-1.15 0.03268	0.00
44	-134.2 -896.4	691.2 -0.13	-0.73 0.01537	0.00
45	-134.2 -752.0	566.6 -0.13	-0.61 0.01070	0.00
46	-4.2 -2957.7	2817.7 0.00	-0.40 0.00551	0.00
47	-134.2 -654.7	485.7 -0.12	-0.53 0.00804	0.00
48	-134.2 -557.4	407.6 -0.12	-0.45 0.00583	0.00
49	-135.6 -478.3	340.5 -0.12	-0.38 0.00445	0.00
51	1794.9 0.0	12000.0 0.17	0.00 0.44333	0.00
52	-595.8 -2965.4	2157.2 -0.30	-1.36 0.03376	0.00
53	-595.8 -2839.8	2048.3 -0.30	-1.29 0.03047	0.00
54	-732.8 -3148.8	2236.8 -0.29	-1.14 0.02331	0.00
55	-732.8 -3025.0	2129.9 -0.29	-1.09 0.02125	0.00
59	-3857.6 -83222.4	82141.2 -0.17	-2.77 0.02698	0.00
60	-430.4 -4958.3	6513.1 -0.07	-0.94 0.04702	0.00
61	-430.8 -13463.1	10039.6 -0.01	-1.30 0.012157	0.00
62	-8538.9 -124692.1	130199.2 -0.14	-1.70 0.01413	0.00
63	-8986.1 -106556.9	107637.2 -0.15	-1.55 0.01165	0.00
64	-7963.9 -85625.2	85450.9 -0.13	-1.28 0.00837	0.00
65	-1031.8 -12612.0	13148.1 -0.09	-0.88 0.00620	0.00
66	234.9 -38324.0	34205.8 0.07	-2.89 0.03247	0.00
67	-8769.1 -55581.4	53938.3 -0.18	-1.09 0.00933	0.00
68	-8784.6 -49610.4	45676.9 -0.20	-1.07 0.00945	0.00
69	-2434.4 -32299.5	37826.3 -0.09	-1.14 0.01188	0.00
70	155.4 -10576.4	15166.3 0.01	-0.53 0.00918	0.00
71	202.6 -13266.7	19912.3 0.01	-0.83 0.00909	0.00
72	88.8 -7069.1	11049.8 0.01	-0.44 0.00460	0.00
73	-2814.7 -5664.2	2037.3 -0.81	-1.68 0.03765	0.00
74	-2822.8 -5269.0	1896.4 -1.01	-1.98 0.07302	0.00
75	-2830.7 -4919.8	1613.4 -0.88	-1.60 0.05414	0.00
76	-2720.0 -6536.8	2826.4 -0.46	-1.14 0.02963	0.00
77	-2728.8 -5590.0	2165.2 -0.61	-1.31 0.05062	0.00
78	-2747.7 -4919.4	1600.2 -0.76	-1.41 0.07930	0.00
79	1013.4 206.6	1341.0 0.65	0.13 0.01665	0.00
80	-3850.8 -5977.7	1095.3 -1.07	-1.69 0.03847	0.00
81	-3870.5 -5812.4	804.5 -1.29	-1.97 0.06788	0.00
82	-1746.4 -3177.3	1454.3 -0.61	-1.11 0.02198	0.00
83	-1753.3 -2966.5	1175.0 -0.86	-1.44 0.06031	0.00
84	12245.8 5614.2	16070.9 1.43	0.66 0.04266	0.00
85	-3644.5 -10540.3	6289.5 -0.49	-1.42 0.02848	0.00
86	-3659.4 -9551.9	5466.6 -0.63	-1.65 0.05452	0.00
87	-3664.2 -8814.1	4784.1 -0.56	-1.37 0.02798	0.00
88	-3670.6 -8139.7	4059.9 -0.65	-1.46 0.02786	0.00
89	-3681.0 -7641.3	3451.4 -0.55	-1.15 0.01392	0.00
90	-10442.2 -14145.6	-3240.5 -1.40	-1.96 -0.69 0.02732	0.00
91	10475.6 5837.6	13819.9 1.48	0.81 2.01 0.03273	0.00
93	-4991.4 -17225.4	10193.1 -0.30	-1.05 0.61 0.01555	0.00
96	-2796.8 -4387.3	-1340.2 -0.90	-1.48 -0.43 0.02424	0.00
97	-2804.4 -3815.3	-2109.1 -0.73	-1.05 -0.51 0.01161	0.00
98	-2814.4 -3597.3	-1950.5 -0.93	-1.27 -0.60 0.01890	0.00

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 16

100	-3451.9	-6767.9	385.7	-0.40	-0.81	0.04	0.00677	0.00
101	-3462.5	-6024.3	-721.1	-0.51	-0.92	-0.10	0.00985	0.00
102	-3471.1	-5465.1	-1407.9	-0.70	-1.17	-0.27	0.02017	0.00
103	-3478.7	-4919.4	-2082.7	-0.84	-1.26	-0.47	0.02777	0.00
104	3933.9	2233.5	5407.5	1.73	0.91	2.45	0.06199	0.00
105	1241.6	-4771.4	7855.7	0.11	-0.40	0.72	0.00870	0.00
106	-1190.8	-4844.5	3610.6	-0.13	-0.54	0.41	0.00557	0.00
107	-1215.4	-3832.3	1940.6	-0.20	-0.60	0.32	0.00620	0.00
108	-1237.1	-2446.3	40.7	-0.29	-0.61	0.01	0.00601	0.00
109	1274.1	443.7	1795.6	0.95	0.30	1.46	0.04437	0.00
110	-854.6	-963.0	-667.8	-0.83	-1.03	-0.64	0.04573	0.00
111	25.4	-1148.9	1747.3	0.00	-0.78	1.07	0.05635	0.00
115	-415.1	-9438.2	10678.6	-0.03	-0.65	0.76	0.00844	0.00
116	-419.0	-7696.2	8274.5	-0.03	-0.77	0.88	0.00983	0.00
117	-1136.5	-2705.4	1198.1	-0.13	-0.32	0.13	0.00265	0.00
118	1559.2	-4284.7	6316.8	0.18	-0.49	0.72	0.00890	0.00
119	2414.6	1252.6	3924.0	0.35	0.17	0.60	0.00604	0.00
120	829.6	-2608.2	3797.7	0.11	-0.34	0.56	0.00672	0.00
121	78.2	-1219.7	1381.2	0.02	-0.30	0.43	0.00769	0.00
122	50.3	-259.3	294.6	0.02	-0.10	0.13	0.00241	0.00
123	745.3	17.5	1520.6	0.20	0.00	0.43	0.00414	0.00
124	-731.5	-5727.2	5436.8	-0.08	-0.66	0.64	0.00901	0.00
125	9.4	-3295.5	3830.0	0.00	-0.46	0.62	0.00951	0.00
126	37.0	-674.7	703.7	0.01	-0.20	0.27	0.00341	0.00
127	5.5	-295.2	232.8	0.00	-0.22	0.17	0.00316	0.00
128	-5.5	-440.9	549.4	0.00	-0.33	0.41	0.01085	0.00
129	0.0	-585.3	692.0	0.00	-0.54	0.80	0.02130	0.00
130	0.0	-236.7	284.6	0.00	-0.26	0.43	0.00825	0.00
133	-961.2	-32062.2	34778.8	-0.08	-1.94	2.09	0.02685	0.00
134	375.8	-1257.8	1463.8	0.08	-0.24	0.28	0.00288	0.00
135	-106.2	-11546.9	13573.6	-0.02	-0.85	1.02	0.06818	0.00
136	-129.8	-2566.9	2322.7	-0.04	-0.43	0.37	0.00812	0.00
137	-31.4	-4306.7	5012.3	-0.02	-0.85	0.97	0.01641	0.00
138	-169.9	-4652.3	4918.0	-0.06	-1.07	1.13	0.03389	0.00
139	-97.2	-987.1	588.1	-0.02	-0.23	0.14	0.00199	0.00
140	-221.6	-8490.2	9240.1	-0.05	-1.45	1.64	0.04118	0.00
141	-469.5	-19403.4	20877.7	-0.06	-1.91	2.13	0.04906	0.00
142	-102.1	-4452.2	5520.8	-0.02	-0.59	0.73	0.00884	0.00
143	1904.6	-15654.8	21379.9	0.10	-0.99	1.35	0.01969	0.00
144	692.9	-2751.8	5885.4	0.02	-0.14	0.25	0.00302	0.00
145	-370.1	-12950.7	12287.9	-0.01	-0.56	0.65	0.02026	0.00
146	-228.7	-6077.2	5638.1	-0.01	-0.26	0.32	0.00368	0.00
148	7.0	-5427.5	6327.9	0.00	-0.27	0.27	0.00410	0.00
149	464.7	-4054.1	5540.6	0.03	-0.29	0.41	0.00358	0.00
150	640.2	-10267.2	12215.5	0.05	-0.89	1.09	0.01155	0.00
151	458.2	-6931.5	8060.9	0.06	-1.02	1.23	0.01892	0.00
152	-7.5	-1249.1	1170.6	0.00	-0.32	0.27	0.00407	0.00
153	3.5	-1227.1	1521.5	0.00	-0.21	0.27	0.00240	0.00
154	94.1	-2374.9	2377.9	0.03	-0.90	0.81	0.03041	0.00
155	-86.1	-3203.1	3506.7	-0.03	-0.90	1.03	0.03910	0.00
156	0.0	-214.1	232.7	0.00	-0.07	0.09	0.00174	0.00
157	-167.1	-454.3	177.5	-0.05	-0.13	0.05	0.00154	0.00
158	1763.4	-10744.3	15342.5	0.11	-0.68	0.99	0.00971	0.00
159	-1311.7	-10028.5	6212.8	-0.08	-0.70	0.46	0.00563	0.00
160	-675.4	-4851.8	3652.7	-0.08	-0.61	0.49	0.00673	0.00
161	878.5	-11624.3	14142.3	0.05	-0.76	0.95	0.01087	0.00
162	894.4	-2062.4	3541.8	0.14	-0.39	0.59	0.00479	0.00
163	1765.3	-9864.5	14466.2	0.12	-0.71	1.05	0.01287	0.00
164	1079.6	-10490.0	12483.7	0.06	-0.59	0.73	0.00745	0.00
165	783.8	-2639.2	4638.1	0.15	-0.61	0.97	0.01281	0.00
166	-783.8	-4191.1	2244.2	-0.10	-0.58	0.34	0.00462	0.00
167	-740.1	-2913.2	1744.6	-0.14	-0.58	0.38	0.00611	0.00
168	1808.8	-7922.3	12194.3	0.15	-0.72	1.09	0.01912	0.00
169	1562.6	-7806.8	11728.5	0.10	-0.55	0.82	0.00795	0.00
170	-100.8	-569.4	451.6	-0.05	-0.28	0.22	0.00590	0.00
174	-100.6	-2292.3	2184.9	0.00	-0.07	0.07	0.00081	0.00
175	1657.0	-5483.6	9406.6	0.15	-0.56	0.88	0.00933	0.00
176	1702.1	-5463.0	9591.6	0.15	-0.53	0.89	0.00856	0.00
177	-508.9	-1688.9	799.3	-0.09	-0.32	0.16	0.00396	0.00
178	2109.0	-4209.6	8194.2	0.31	-0.69	1.23	0.01764	0.00
179	1212.9	-1669.7	3729.8	0.25	-0.39	0.79	0.01082	0.00
180	1177.4	-3428.5	6331.0	0.19	-0.65	1.07	0.01643	0.00
181	1482.3	-7954.4	7850.1	0.26	-1.37	1.40	0.04074	0.00
182	-200.8	-1921.3	787.3	-0.11	-0.87	0.48	0.02184	0.00
183	-1562.9	-5802.3	1757.3	-0.31	-1.03	0.32	0.02011	0.00
184	-1585.6	-4445.3	833.5	-0.38	-0.95	0.18	0.02480	0.00
185	-285.0	-601.7	56.4	-0.30	-0.54	0.06	0.01693	0.00
186	-1969.8	-3100.8	-833.9	-0.67	-1.32	-0.33	0.03097	0.00
187	-73.8	-1242.3	1057.8	-0.07	-0.75	0.68	0.02186	0.00
188	-103.8	-518.5	319.4	-0.17	-0.69	0.45	0.02194	0.00
189	-123.4	-229.3	-4.1	-0.37	-0.57	-0.01	0.01956	0.00
190	-2117.4	-2704.4	-1182.1	-1.14	-1.45	-0.57	0.04723	0.00
196	-698.5	-2778.8	1984.9	-0.27	-0.99	0.62	0.02126	0.00
197	709.2	-1786.5	2560.9	0.40	-0.82	1.34	0.02981	0.00
199	-737.9	-1731.2	824.9	-0.58	-1.24	0.61	0.04473	0.00
200	-2879.7	-3848.4	-1342.4	-1.14	-1.35	-0.48	0.07964	0.00

TOTAL EVAPORATION RATE (CF8) 0.319E+02

TOTAL SURFACE AREA (SQ. FT.) 0.204E+10

TOTAL VOLUME (CU. FT.) 0.392E+11

FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 17

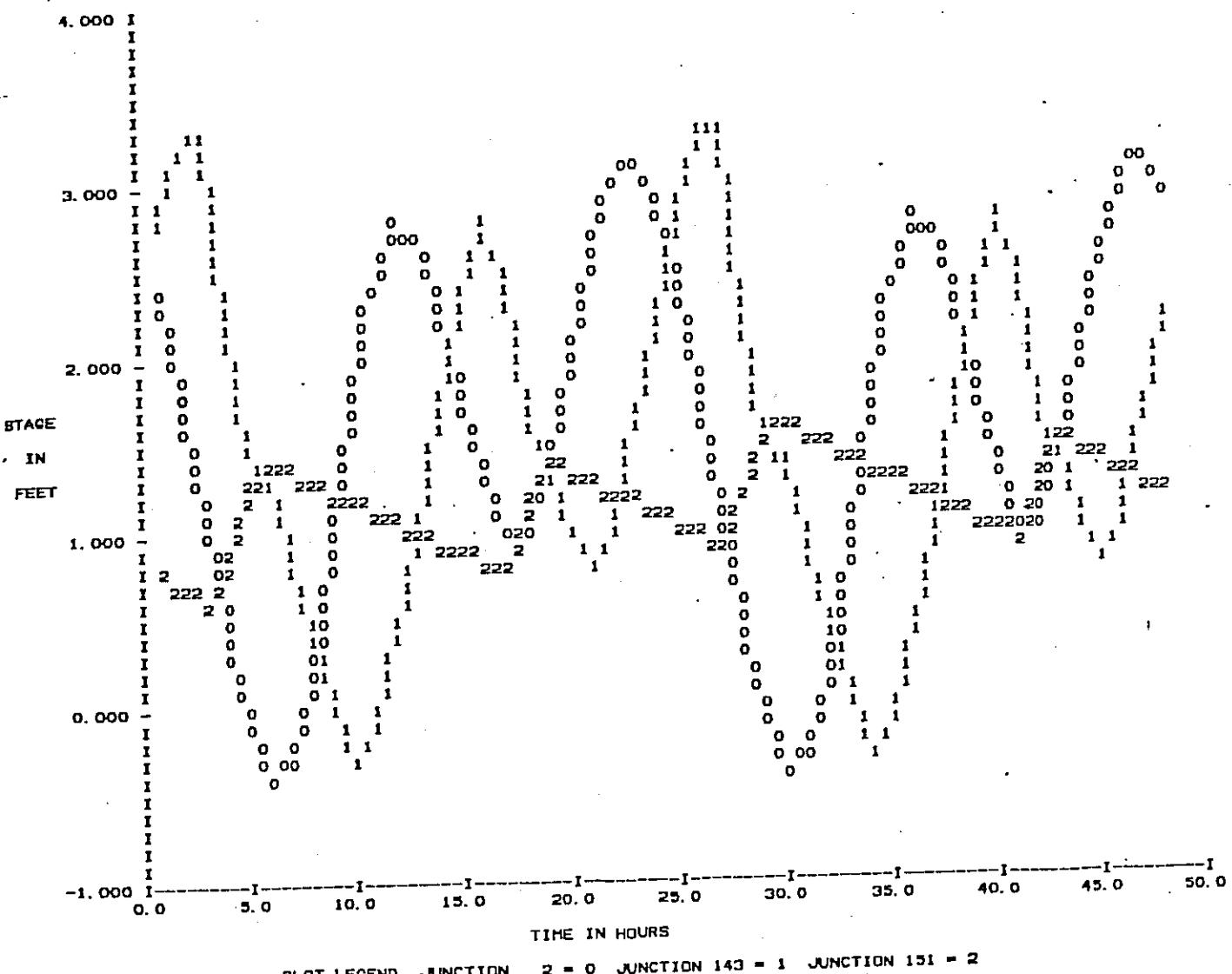


FIGURE VI-3 (Cont.)
 LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 18

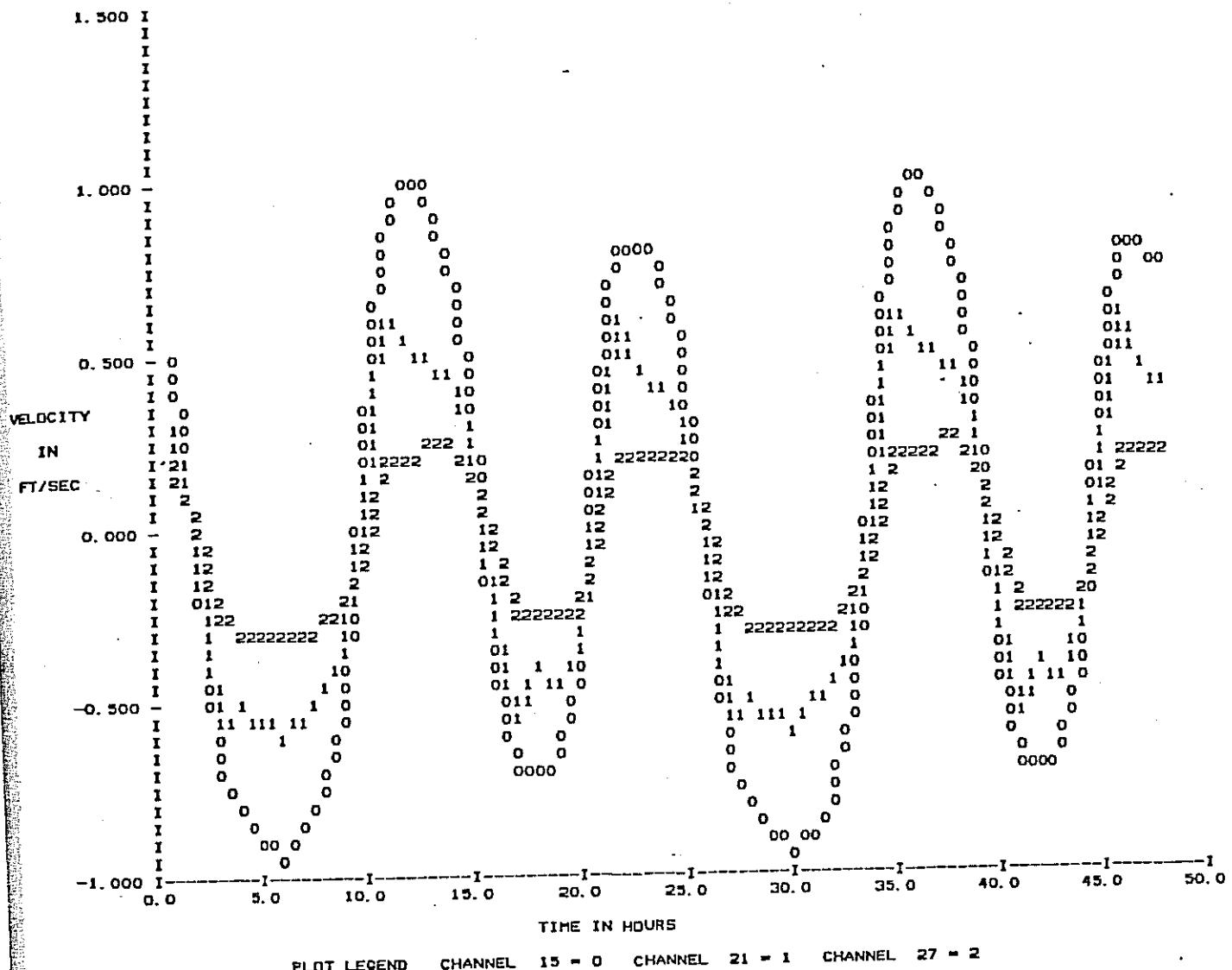


FIGURE VI-3 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE APPLICATION PRINTOUT PAGE 19

7 CARDS SKIPPED TO REACH THE "ER" CARD

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** STAGE PLOTS
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY.. PLOT DEMONSTRATION

STAGE DATA AVAILABLE FOR PLOTS
SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

FRI, FEB 28 1986 15:31:09

AT NODES	2	53	54	59	75	65	90	87
	89	4	112	118	8	126	123	143
	145	144	146	147	128	142	150	25
	22	11	16	34	163	80	162	151

NODE 11. GAGE B95100

TIME	COMP	OBS	TIME	COMP	OBS	TIME	COMP	OBS	TIME	COMP	OBS
0. 50	3. 17	3. 02	2. 50	2. 57	2. 11	4. 50	1. 50	1. 13	6. 50	0. 42	0. 32
8. 50	-0. 03	0. 39	10. 50	0. 82	1. 37	12. 50	2. 09	2. 41	14. 50	2. 68	2. 76
16. 50	2. 02	2. 05	18. 50	1. 22	1. 34	20. 50	1. 42	1. 55	22. 50	2. 45	2. 42
24. 50	3. 17	3. 10	26. 50	2. 58	2. 54	28. 50	1. 50	1. 55	30. 50	0. 43	0. 57
32. 50	-0. 08	0. 04	34. 50	0. 62	0. 89	36. 50	1. 84	1. 87	38. 50	2. 57	2. 57
40. 50	2. 02	1. 98	42. 50	1. 11	1. 15	44. 50	0. 71	0. 77	46. 50	1. 58	1. 65
48. 50	2. 65	2. 57	50. 50	2. 89	2. 72	52. 50	1. 93	1. 73	54. 50	0. 77	0. 70
56. 50	-0. 05	-0. 12	58. 50	0. 19	0. 38	60. 50	1. 33	1. 37	62. 50	2. 34	2. 30
64. 50	2. 10	2. 07	66. 50	1. 19	1. 16	68. 50	0. 44	0. 44	70. 50	1. 07	1. 08

NUMBER OF Y VALUES

36. 0000

SLOPE

1. 0568

MEAN OF Y

1. 5343

MEAN OF X

1. 5542

Y-INTERCEPT

-0. 1081

SUM OF Y**2

116. 9106

SUM OF SQUARES MEAN

64. 7502

SUM OF SQUARES SLOPE

30. 9948

RESIDUAL

1. 16557

STANDARD DEVIATION OF X

0. 8905

STANDARD DEVIATION OF Y

0. 9586

STANDARD DEVIATION ERROR

0. 1852

STANDARD DEVIATION Y-BAR

0. 0309

STANDARD DEVIATION SLOPE

0. 0351

STANDARD DEVIATION Y-INTERCEPT

0. 0627

F-RATIO FOR SLOPE

904. 1249

CORRELATION COEFFICIENT

0. 9817

MAXIMUM X VALUE

3. 1000

MINIMUM X VALUE

-0. 1200

MAXIMUM Y VALUE

3. 1680

MINIMUM Y VALUE

-0. 0780

RELATIVE ERROR

0. 0128

RMS ERROR

0. 1799

STD ERR OF EST

0. 0309

T-STATISTIC FOR SLOPE=1. 0

1. 6158

T-STATISTIC FOR INTERCEPT=0. 0

-1. 7230

0 CARDS SKIPPED TO REACH THE "ER" CARD

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** FLOW PLOTS
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY.. PLOT DEMONSTRATION

FLOW DATA AVAILABLE FOR PLOTS

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

FRI, FEB 28 1986 15:31:09

AT CHANNELS	3	62	104	190	66	8	12	15
	35	21	47	24	27	49	53	54
	168	169	69	76	85	99	103	109
	51							

NOTE... NODE OR CHANNEL 57 IS NOT AVAILABLE FOR PLOTTING

0 CARDS SKIPPED TO REACH THE "ER" CARD

FIGURE VI-4
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 1

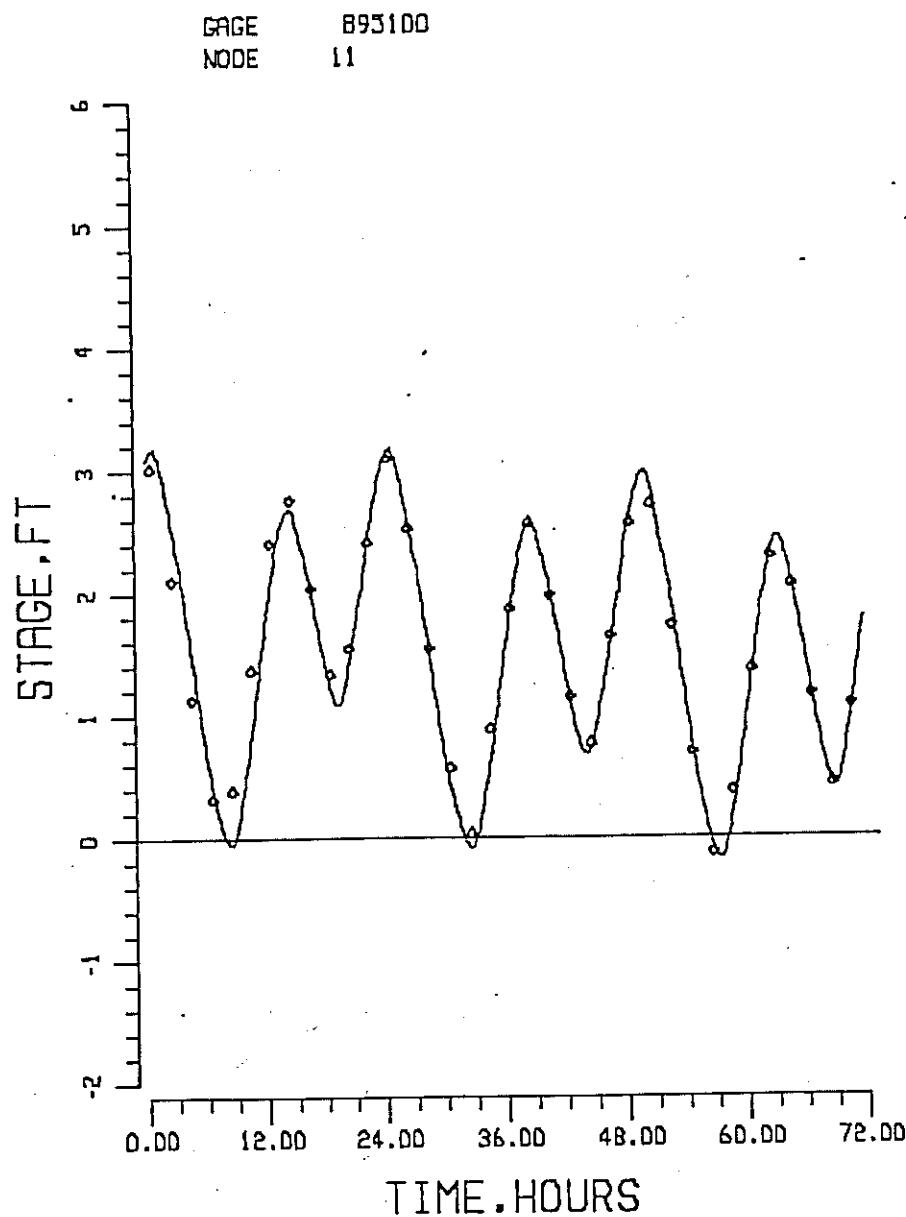


FIGURE VI-4 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 2

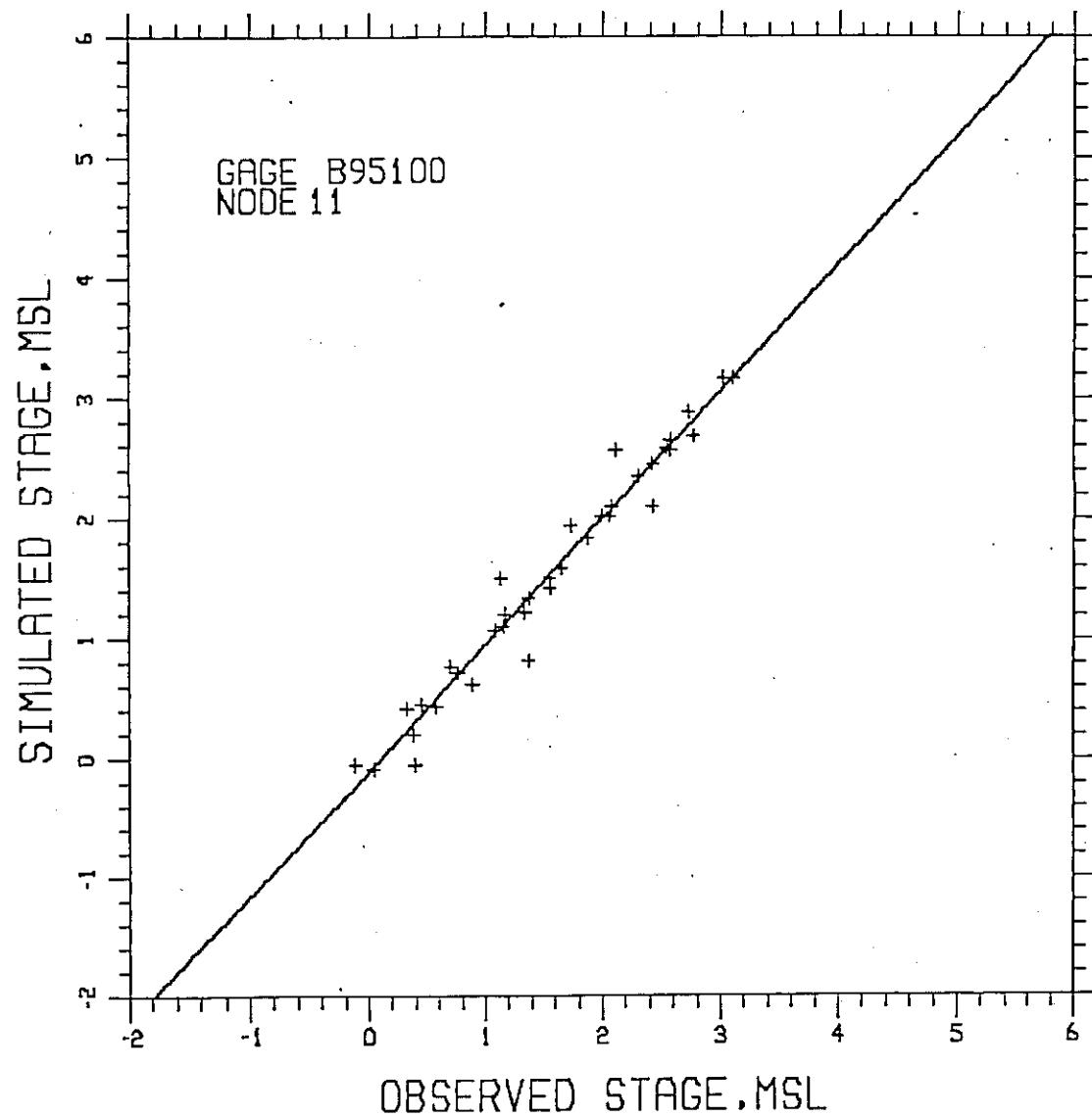


FIGURE VI-4 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 3

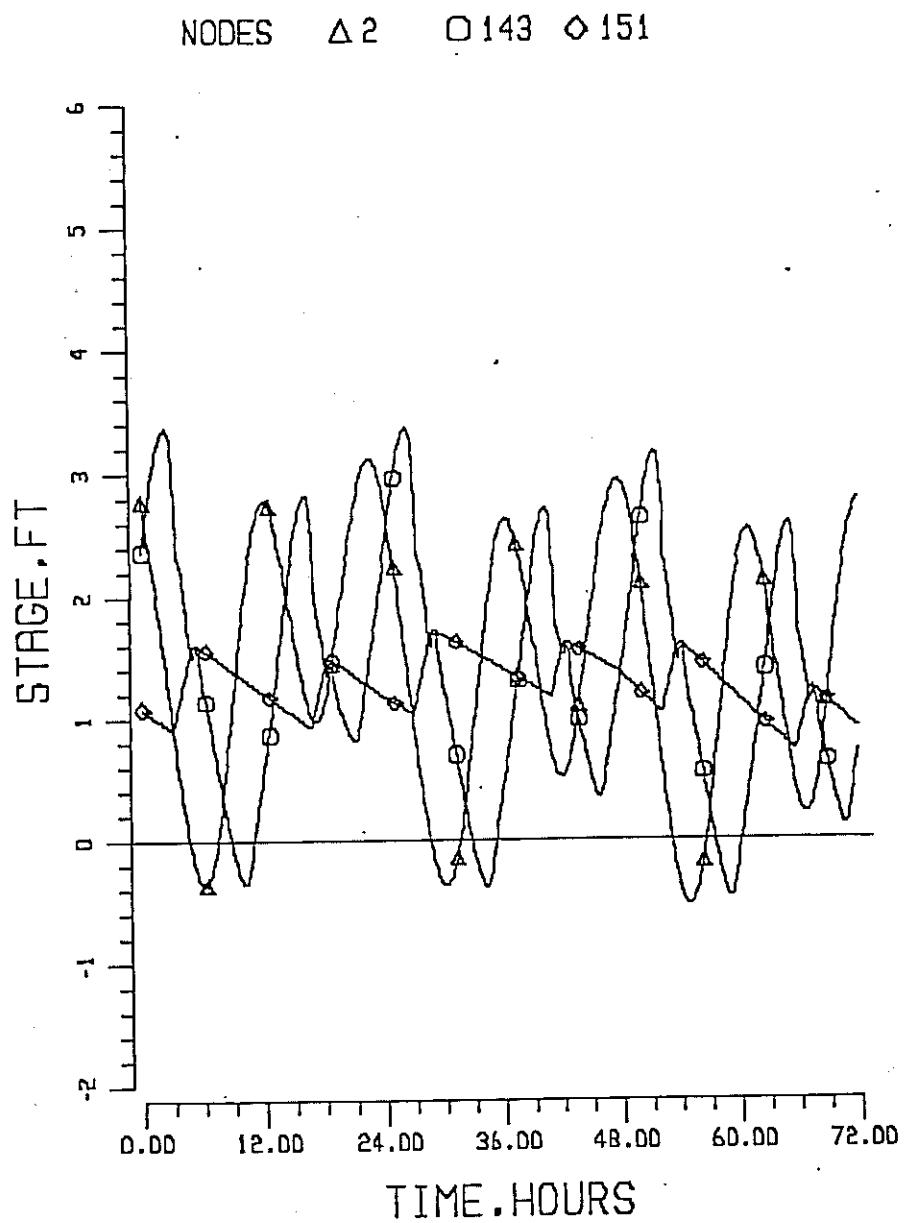


FIGURE VI-4 (Cont.)
LINK-NODE HYDRODYNAMIC MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 4

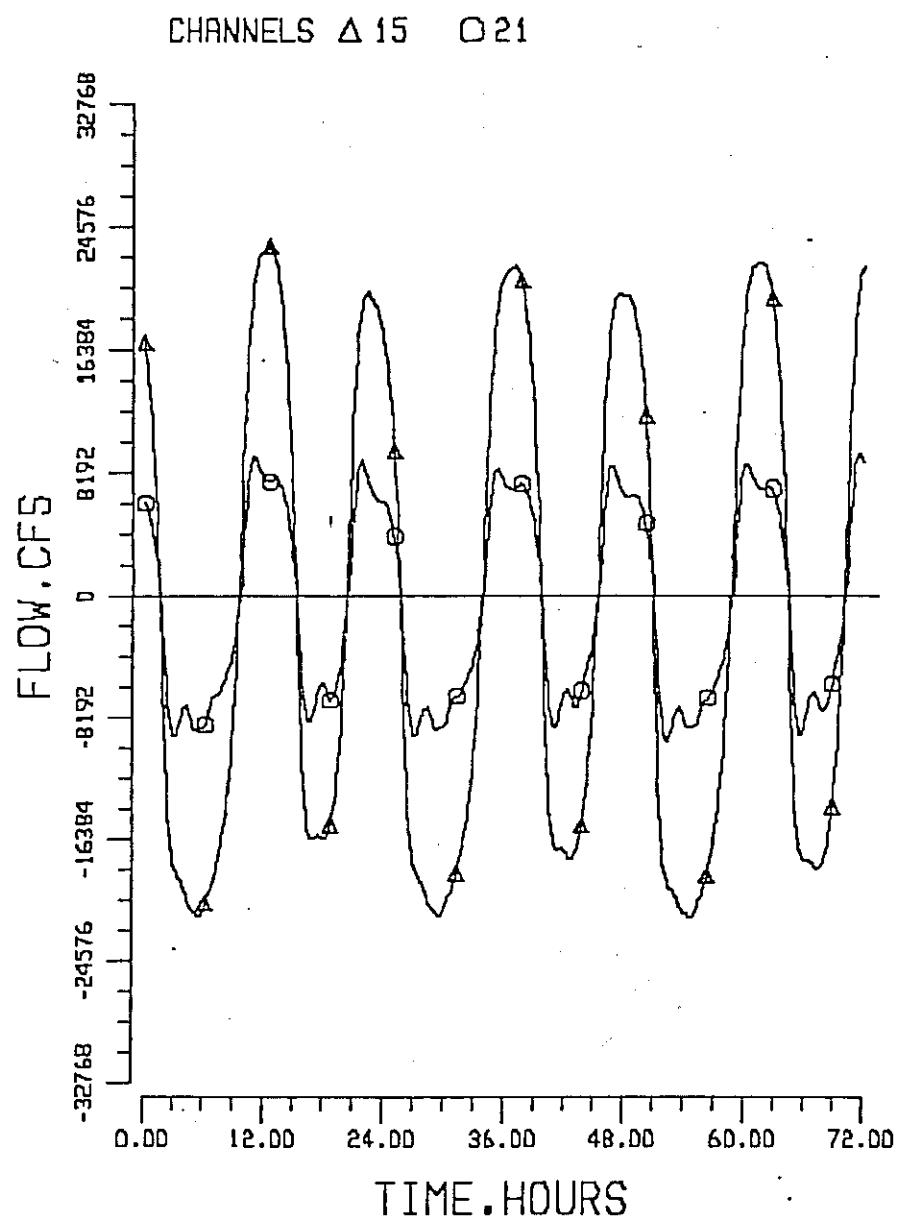


FIGURE VI-5
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 1

CARD TYPE	DATA																													
SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY																														
1	1	0	1	1	1	2	24	1	1	1	12	0	9	8	14	11	13													
2	244	1	1	1	1	2	24	1	1	1	12	0	9	8	14	11	13													
3	6																													
4	1																													
5	1	1																												
6	B	0	0	0	18	24	45																							
7a	B	0	0	0	6	12	18																							
7b	2	4	6	8	10	12	14	16	18	20	22	24	26	28	45	158														
7b	33	34	35	36	163																									
8	1	592	0.03	0.04	1.00	0.35	0.98	0.03	8.69	20.9	0.58	0.08																		
8	2	304	0.04	0.04	1.00	0.18	0.49	0.04	8.70	20.8	0.45	0.09																		
8	3	399	0.01	0.04	1.00	0.23	0.51	0.03	8.98	20.9	0.57	0.16																		
8	4	237	0.01	0.04	1.00	0.15	0.28	0.03	9.02	20.8	0.49	0.17																		
8	5	177	0.02	0.04	1.00	0.13	0.23	0.03	9.02	20.8	0.45	0.16																		
8	6	129	0.03	0.04	1.00	0.12	0.21	0.04	8.91	20.7	0.40	0.14																		
8	7	105	0.03	0.04	1.00	0.12	0.20	0.04	8.85	20.7	0.37	0.14																		
8	8	107	0.05	0.05	1.00	0.15	0.26	0.05	8.65	20.6	0.34	0.10																		
8	9	89	0.05	0.05	1.00	0.16	0.29	0.05	8.63	20.6	0.31	0.10																		
8	10	88	0.06	0.05	1.00	0.17	0.33	0.06	8.63	20.6	0.31	0.10																		
8	11	87	0.06	0.05	1.00	0.18	0.33	0.06	8.64	20.6	0.31	0.11																		
8	12	94	0.04	0.06	1.00	0.16	0.17	0.04	8.70	20.7	0.37	0.16																		
8	13	104	0.04	0.07	1.00	0.19	0.18	0.05	8.45	20.6	0.34	0.17																		
8	14	115	0.04	0.09	1.00	0.22	0.15	0.05	8.32	20.6	0.35	0.20																		
8	15	139	0.06	0.11	1.00	0.31	0.16	0.06	8.20	20.7	0.38	0.26																		
8	16	158	0.06	0.13	1.00	0.37	0.16	0.06	8.09	20.7	0.40	0.30																		
8	17	182	0.07	0.16	1.00	0.45	0.16	0.07	7.75	20.7	0.44	0.37																		
8	18	303	0.13	0.29	1.00	0.83	0.22	0.11	7.89	20.7	0.50	0.48																		
8	19	391	0.18	0.37	1.00	1.13	0.32	0.14	7.82	20.9	0.61	0.60																		
8	20	498	0.25	0.47	1.00	1.50	0.47	0.18	7.51	21.0	0.77	0.75																		
8	21	619	0.32	0.55	1.00	1.91	0.74	0.23	7.00	21.3	1.00	0.92																		
8	22	640	0.32	0.55	1.00	1.96	0.88	0.24	8.81	21.4	1.11	0.96																		
8	23	723	0.37	0.59	1.00	2.22	1.18	0.26	6.56	21.5	1.34	1.04																		
8	24	741	0.36	0.56	1.00	2.25	1.41	0.26	6.18	21.6	1.52	1.12																		
8	25	741	0.36	0.56	1.00	2.25	1.41	0.26	6.18	21.6	1.52	1.12																		
8	26	758	0.37	0.54	1.00	2.30	1.64	0.26	5.82	21.7	1.68	1.16																		
8	27	766	0.40	0.55	1.00	2.37	1.75	0.27	5.69	21.7	1.66	1.09																		
8	28	766	0.40	0.55	1.00	2.37	1.75	0.27	5.69	21.7	1.66	1.09																		
8	29	783	0.41	0.50	1.00	2.44	2.31	0.26	5.99	21.8	2.01	1.19																		
8	30	791	0.43	0.45	1.00	2.45	2.87	0.25	7.62	22.0	2.39	1.38																		
8	31	823	0.41	0.49	1.00	1.65	1.04	0.18	5.00	21.0	0.97	0.61																		
8	32	823	0.41	0.47	1.00	1.11	0.35	0.13	4.13	20.5	0.40	0.32																		
8	33	811	0.52	0.05	1.00	1.62	3.17	0.04	8.90	22.1	2.68	0.34																		
8	34	800	0.56	0.07	1.00	1.40	3.19	0.05	8.80	22.1	2.63	0.27																		
8	35	801	0.59	0.07	1.00	1.51	3.35	0.04	8.59	22.1	2.55	0.29																		
8	36	801	0.62	0.07	1.00	1.49	3.45	0.04	8.47	22.1	2.51	0.28																		
8	37	811	0.04	0.10	1.00	0.24	0.13	0.05	8.26	20.6	0.35	0.21																		
8	38	801	0.08	0.18	1.00	0.50	0.17	0.07	7.57	20.7	0.42	0.34																		
8	39	800	0.02	0.06	1.00	0.20	0.14	0.04	9.15	20.9	0.46	0.35																		
8	40	800	0.00	0.03	1.00	0.06	0.10	0.02	9.28	21.0	0.54	0.34																		
8	41	800	0.07	0.04	1.00	0.08	0.32	0.05	8.55	20.6	0.29	0.05																		
8	42	800	0.08	0.05	1.00	0.09	0.39	0.06	8.49	20.6	0.27	0.03																		
8	43	800	0.07	0.06	1.00	0.10	0.40	0.07	8.38	20.5	0.18	0.00																		
8	44	800	0.00	0.03	1.00	0.06	0.10	0.02	9.28	21.0	0.54	0.34																		
8	45	800	0.07	0.04	1.00	0.08	0.32	0.05	8.55	20.6	0.29	0.05																		
8	46	800	0.08	0.05	1.00	0.09	0.39	0.06	8.49	20.6	0.27	0.03																		
8	47	800	0.09	0.05	1.00	0.07	0.55	0.07	8.38	20.5	0.18	0.00																		
8	48	800	0.09	0.05	1.00	0.07	0.60	0.08	8.39	20.5	0.18	0.01																		
8	49	800	0.08	0.04	1.00	0.07	0.44	0.06	8.29	20.5	0.19	0.01																		
8	50	800	0.07	0.04	1.00	0.08	0.32	0.05	8.55	20.6	0.29	0.05																		
8	51	800	0.08	0.05	1.00	0.09	0.39	0.06	8.49	20.6	0.27	0.03																		
8	52	800	0.09	0.05	1.00	0.09	0.39	0.06	8.49	20.6	0.27	0.03																		
8	53	800	0.07	0.05	1.00	0.09	0.39	0.06	8.52	20.6	0.26	0.04																		
8	54	800	0.09	0.05	1.00	0.07	0.55	0.07	8.38	20.5	0.18	0.00																		
8	55	800	0.09	0.05	1.00	0.07	0.60	0.08	8.39	20.5	0.18	0.01																		
8	56	800	0.08	0.04	1.00	0.07	0.44	0.06	8.29	20.5	0.19	0.01																		
8	57	800	0.06	0.04	1.00	0.04	0.15	0.04	8.32	20.7	0.23	0.03																		
8	58	800	0.07	0.04	1.00	0.05	0.19	0.04	8.14	20.7	0.18	0.02																		
8	59	800	0.06	0.04	1.00	0.03	0.07	0.02	8.04	20.8	0.15	0.02																		
8	60	800	0.10	0.05	1.00	0.11	0.98	0.10	8.47	20.2	0.14	0.00																		
8	61	800	0.10	0.05	1.00	0.09	0.75	0.08	8.35	20.2	0.15	0.00																		
8	62	800	0.09	0.05	1.00	0.09	0.74	0.08	8.36	20.3	0.16	0.00																		
8	63	800	0.09	0.05	1.00	0.10	0.89	0.09	8.36	20.1	0.13	0.00																		
8	64	800	0.09	0.05	1.00	0.10	0.85	0.09	8.35	20.1	0.13	0.00																		
8	65	800	0.09	0.05	1.00	0.10	0.88	0.09	8.35	20.1	0.13	0.00																		
8	66	800	0.09	0.05	1.00	0.10	0.89	0.10	8.32	20.4	0.15	0.00																		
8	67	800	0.09	0.05	1.00	0.09	0.77	0.09	8.40	20.1	0.15	0.00																		
8	68	800	0.09	0.05	1.00	0.09	0.66	0.09	8.41	20.1	0.14	0.00																		
8	69	800	0.09	0.05	1.00	0.09	0.63	0.09	8.36	20.1	0.14	0.00																		
8	70	800	0.09	0.05	1.00	0.09	0.87	0.09	8.35	20.1	0.13	0.00																		
8	71	800	0.10	0.05	1.00	0.06	0.80	0.09	8.45	20.3	0.17	0.00																		
8	72	800	0.09	0.05	1.00	0.07	0.74	0.09	8.38	20.3	0.16	0.00																		
8	73	800	0.09	0.05	1.00	0.07	0.80	0.09	8.39	20.3	0.15	0.00																		

FIGURE VI-5 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 2

CARD TYPE	DATA																	
8	74	74	80	0.09	0.05	1.00	0.07	0.82	0.09	8.38	20.2	0.15	0.01					
8	75	75	80	0.09	0.05	1.00	0.07	0.85	0.09	8.36	20.2	0.14	0.01					
8	76	76	80	0.09	0.05	1.00	0.11	0.86	0.09	8.35	20.2	0.13	0.00					
8	80	80	75	0.10	0.05	1.00	0.24	0.74	0.09	8.39	20.4	0.15	0.03					
8	81	81	83	0.09	0.05	1.00	0.15	0.74	0.09	8.39	20.3	0.17	0.02					
8	82	82	80	0.09	0.05	1.00	0.08	0.79	0.09	8.39	20.3	0.15	0.00					
8	83	83	81	0.09	0.05	1.00	0.06	0.80	0.09	8.39	20.3	0.16	0.00					
8	84	84	77	0.09	0.05	1.00	0.36	0.72	0.08	8.31	20.4	0.18	0.09					
8	85	85	77	0.09	0.05	1.00	0.30	0.78	0.08	8.45	20.4	0.16	0.06					
8	86	86	77	0.09	0.05	1.00	0.34	0.80	0.08	8.43	20.3	0.17	0.08					
8	87	87	76	0.09	0.05	1.00	0.36	0.81	0.08	8.47	20.3	0.18	0.08					
8	88	88	72	0.02	0.02	1.00	0.13	0.35	0.05	9.64	21.3	0.53	0.39					
8	89	87	37	0.12	0.05	1.00	3.33	1.01	0.03	8.26	19.9	0.08	0.00					
8	90	90	76	0.09	0.04	1.00	0.25	0.50	0.07	8.55	20.6	0.23	0.06					
8	91	91	76	0.08	0.05	1.00	0.29	0.51	0.07	8.61	20.6	0.24	0.08					
8	92	92	76	0.09	0.05	1.00	0.31	0.66	0.08	8.55	20.5	0.20	0.07					
8	93	93	76	0.09	0.05	1.00	0.32	0.77	0.08	8.49	20.4	0.17	0.07					
8	95	95	72	0.06	0.04	1.00	0.16	0.28	0.05	8.78	20.8	0.33	0.06					
8	96	96	78	0.09	0.05	1.00	0.24	0.44	0.07	8.59	20.7	0.25	0.07					
8	97	97	68	0.08	0.03	1.00	0.20	0.40	0.06	8.72	20.8	0.27	0.03					
8	98	98	68	0.07	0.03	1.00	0.17	0.30	0.06	8.92	21.0	0.36	0.08					
8	99	99	88	0.02	0.05	1.00	0.16	0.14	0.04	9.34	20.9	0.46	0.36					
8	100	100	61	0.02	0.02	1.00	0.11	0.16	0.04	9.38	21.2	0.49	0.11					
8	101	101	95	0.00	0.05	1.00	0.15	0.08	0.02	9.68	21.0	0.49	0.56					
8	102	102	139	0.00	0.09	1.00	0.26	0.08	0.03	9.99	21.2	0.60	0.93					
8	103	103	221	0.04	0.18	1.00	0.53	0.14	0.06	9.60	21.2	0.70	1.01					
8	104	104	585	0.12	0.48	1.00	1.43	0.61	0.18	9.00	21.5	1.39	1.97					
8	105	105	524	0.04	0.43	1.00	1.12	0.42	0.14	10.92	21.7	1.41	2.39					
8	110	110	95	0.00	0.03	1.00	0.06	0.06	0.02	9.13	21.1	0.38	0.23					
8	111	111	112	0.00	0.04	1.00	0.06	0.07	0.02	8.94	21.0	0.31	0.19					
8	112	112	107	0.00	0.04	1.00	0.06	0.07	0.02	8.87	21.0	0.29	0.18					
8	113	113	100	0.01	0.04	1.00	0.09	0.11	0.03	9.23	20.8	0.43	0.23					
8	114	114	91	0.00	0.04	1.00	0.07	0.08	0.02	9.17	21.0	0.38	0.23					
8	115	115	91	0.01	0.04	1.00	0.09	0.11	0.03	9.20	20.9	0.41	0.24					
8	116	116	94	0.02	0.06	1.00	0.14	0.17	0.04	9.05	20.7	0.42	0.21					
8	117	117	90	0.01	0.05	1.00	0.09	0.08	0.03	9.14	20.9	0.40	0.25					
8	118	118	82	0.00	0.04	1.00	0.04	0.04	0.02	8.79	21.1	0.24	0.18					
8	119	119	87	0.00	0.04	1.00	0.07	0.08	0.02	9.20	21.0	0.38	0.24					
8	121	121	86	0.00	0.04	1.00	0.04	0.04	0.01	8.77	21.1	0.23	0.17					
8	122	122	76	0.00	0.03	1.00	0.02	0.02	0.01	8.39	21.1	0.10	0.09					
8	123	123	87	0.00	0.05	1.00	0.06	0.04	0.02	8.81	20.8	0.32	0.23					
8	124	124	92	0.01	0.06	1.00	0.10	0.07	0.03	8.97	20.7	0.39	0.24					
8	125	125	105	0.02	0.07	1.00	0.15	0.10	0.04	8.72	20.6	0.39	0.23					
8	126	126	91	0.00	0.05	1.00	0.08	0.05	0.02	8.91	20.7	0.38	0.24					
8	127	127	137	0.04	0.11	1.00	0.27	0.11	0.05	8.07	20.5	0.34	0.24					
8	128	128	152	0.04	0.13	1.00	0.29	0.09	0.05	8.01	20.5	0.35	0.28					
8	129	129	184	0.04	0.17	1.00	0.35	0.09	0.06	7.99	20.5	0.39	0.36					
8	130	130	93	0.00	0.06	1.00	0.08	0.04	0.02	8.79	20.6	0.34	0.24					
8	131	131	166	0.03	0.15	1.00	0.28	0.06	0.05	8.27	20.5	0.39	0.35					
8	135	135	356	0.12	0.35	1.00	0.88	0.17	0.11	6.74	20.8	0.54	0.63					
8	136	136	357	0.16	0.35	1.00	1.00	0.23	0.12	6.20	20.8	0.54	0.56					
8	140	140	100	0.00	0.07	1.00	0.09	0.04	0.02	8.66	20.6	0.32	0.25					
8	141	141	168	0.02	0.15	1.00	0.27	0.06	0.04	8.51	20.5	0.42	0.39					
8	142	142	192	0.01	0.14	1.00	0.27	0.08	0.04	9.05	20.6	0.61	0.49					
8	143	143	112	0.02	0.09	1.00	0.12	0.17	0.02	9.21	20.4	0.42	0.39					
8	144	144	354	0.10	0.08	1.00	0.49	0.69	0.04	9.01	21.0	1.18	0.36					
8	145	145	783	0.38	0.07	1.00	1.22	2.09	0.07	7.93	21.9	2.31	0.27					
8	146	146	663	0.16	0.06	1.00	0.88	1.34	0.07	9.08	21.7	2.19	0.33					
8	147	147	801	0.46	0.07	1.00	1.32	2.50	0.06	8.11	22.0	2.43	0.28					
8	148	148	312	0.07	0.08	1.00	0.33	0.34	0.04	0.03	10.20	21.2	1.50	0.64				
8	149	149	472	0.15	0.04	1.00	0.49	0.75	0.04	11.46	21.8	2.41	0.72					
8	150	150	793	0.57	0.07	1.00	1.43	3.13	0.05	8.42	22.1	2.49	0.29					
8	151	151	128	0.00	0.07	1.00	0.10	0.05	0.02	8.94	21.3	0.61	0.41					
8	37	38	831	0.34	0.41	1.00	2.37	2.93	0.24	9.43	22.1	2.81	1.53					
8	39	40	805	0.42	0.43	1.00	2.43	2.97	0.24	8.28	22.1	2.55	1.42					
8	44	46	813	0.48	0.39	1.00	2.39	3.41	0.25	8.12	22.2	2.76	1.33					
8	158	158	801	0.48	0.31	1.00	1.94	3.12	0.19	8.73	22.1	2.65	0.98					
8	159	159	798	0.50	0.08	1.00	1.11	2.87	0.06	9.08	22.1	2.74	0.51					
8	160	160	807	0.70	0.11	1.00	1.36	3.64	0.05	7.71	23.4	0.86	0.89					
8	161	161	813	0.72	0.08	1.00	1.34	3.85	0.05	7.89	23.3	0.81	0.84					
8	162	162	801	0.63	0.07	1.00	1.52	3.34	0.04	8.40	22.1	2.47	0.28					
8	163	163	800	0.69	0.08	1.00	1.55	3.77	0.03	8.09	21.9	2.37	0.26					
8		0																

FIGURE VI-5 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 3

CARD TYPE	DATA												
9	STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY												
10		1	1		1		8	1	12				
11	EX	1	1000	.045	.04	500	.6	2	.03	8.8	21	1.5	.1
11	EX	25	1000	.045	.04	500	.6	2	.03	8.8	21	1.5	.1
12	89	0	50	.11	.05	500	.1	1	.05	8.3	20	.22	.02
12	63	0	80	.09	.05	500	.1	1.0	.10	8.3	20	.21	.01
12	163	0	800	.75	.08	1000	1.6	5.5	.03	7.7	22	4.5	0.5
12	158	0	1000	.35	7.	100	15	23	4.0	8	24	1.	25.
12	0												
13	1	19	2.0	0.	0.	0.	0	5	0	0	0		
13	20	25	2.0	0.	0.	0.	0	5	500.	0	0		
13	26	29	2.0	0.	0.	0.	0	5	0	0	0		
13	30	31	2.0	0.	0.	0.	0	5	0	0	500.		
13	32	163	2.0	0.	0.	0.	0	5	0	0	0		
13	0												
14	1	0.2	17.2	13.3	2.1	1009		99	9	1	1		
14	2	0.2	16.9	13.1	2.2	1009		99	9	1	4		
14	3	0.2	16.5	13.0	2.4	1009		99	9	1	7		
14	4	0.2	16.1	12.8	2.6	1010		99	9	1	10		
14	5	0.1	16.1	12.6	2.4	1010		99	9	1	13		
14	6	0.1	16.1	12.4	2.2	1010		99	9	1	16		
14	7	0.0	16.1	12.2	2.1	1011		99	9	1	19		
14	8	0.0	18.5	12.4	2.6	1011		99	9	1	22		
14	9	0.0	20.9	12.6	3.1	1011		99	9	1	25		
14	10	0.0	23.3	12.8	3.6	1012		99	9	1	28		
14	11	0.0	26.1	13.1	3.8	1011		99	9	1	31		
14	12	0.0	28.9	13.5	3.9	1010		99	9	1	34		
14	13	0.0	31.7	13.9	4.1	1010		99	9	1	37		
14	14	0.0	32.2	13.1	4.3	1009		99	9	1	40		
14	15	0.0	32.8	12.4	4.5	1009		99	9	1	43		
14	16	0.0	33.3	11.7	4.6	1009		99	9	1	46		
14	17	0.0	31.5	11.5	4.5	1008		99	9	1	49		
14	18	0.0	29.6	11.3	4.3	1008		99	9	1	52		
14	19	0.0	27.8	11.1	4.1	1009		99	9	1	55		
14	20	0.0	25.7	12.0	4.1	1009		99	9	1	58		
14	21	0.0	23.7	13.0	4.1	1009		99	9	1	61		
14	22	0.0	21.7	13.9	4.1	1009		99	9	1	64		
14	23	0.0	20.7	13.7	3.6	1009		99	9	1	67		
14	24	0.0	19.8	13.5	3.1	1010		99	9	1	70		
14	1	0.0	18.9	13.3	2.6	1010		99	9	2	1		
14	2	0.0	18.5	12.8	2.6	1010		99	9	2	4		
14	3	0.0	18.1	12.2	2.6	1010		99	9	2	7		
14	4	0.0	17.8	11.7	2.6	1010		99	9	2	10		
14	5	0.0	17.8	11.5	2.2	1011		99	9	2	13		
14	6	0.0	17.8	11.3	1.9	1011		99	9	2	16		
14	7	0.0	17.8	11.1	1.5	1012		99	9	2	19		
14	8	0.0	20.4	11.5	2.2	1012		99	9	2	22		
14	9	0.0	23.0	11.9	2.9	1012		99	9	2	25		
14	10	0.0	25.6	12.2	3.6	1012		99	9	2	28		
14	11	0.0	28.0	11.9	3.8	1011		99	9	2	31		
14	12	0.0	30.4	11.5	3.9	1011		99	9	2	34		
14	13	0.0	32.8	11.1	4.1	1011		99	9	2	37		
14	14	0.0	33.3	10.9	4.5	1010		99	9	2	40		
14	15	0.0	33.9	10.7	4.8	1010		99	9	2	43		
14	16	0.0	34.4	10.6	5.1	1009		99	9	2	46		
14	17	0.0	31.5	11.5	5.1	1009		99	9	2	49		
14	18	0.0	28.5	12.4	5.1	1010		99	9	2	52		
14	19	0.0	25.6	13.3	5.1	1010		99	9	2	55		
14	20	0.0	23.3	12.8	5.1	1010		99	9	2	58		
14	21	0.0	21.1	12.2	5.1	1010		99	9	2	61		
14	22	0.0	18.9	11.7	5.1	1011		99	9	2	64		
14	23	0.0	18.1	11.1	4.3	1011		99	9	2	67		
14	24	0.0	17.4	10.6	3.4	1011		99	9	3	70		
14	1	0.0	16.7	10.0	2.6	1012		99	9	3	73		
14	2	0.0	15.9	10.2	2.6	1011		99	9	3	76		
14	3	0.0	15.2	10.4	2.6	1011		99	9	3	79		
14	4	0.0	14.4	10.6	2.6	1012		99	9	3	82		

FIGURE VI-5 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 4

CARD TYPE	DATA							
14	5 0.0 14.8 10.6 2.2 1012							
14	6 0.0 15.2 10.6 1.9 1012							
14	7 0.0 15.6 10.6 1.5 1013	99	9	3	7			
14	8 0.0 18.7 10.2 2.6 1013							
14	9 0.0 21.7 9.8 3.6 1013							
14	10 0.0 25.0 9.4 4.6 1013	99	9	3	10			
14	11 0.0 27.2 10.0 4.6 1013							
14	12 0.0 29.4 10.6 4.6 1012							
14	13 0.0 31.7 11.1 4.6 1012	99	9	3	13			
14	14 0.0 32.2 10.7 5.5 1011							
14	15 0.0 32.8 10.4 6.4 1010							
14	16 0.0 33.3 10.0 7.2 1010	99	9	3	16			
14	17 0.0 30.7 10.7 6.7 1009							
14	18 0.0 28.1 11.5 6.2 1009							
14	19 0.0 25.6 12.2 5.7 1010	99	9	3	17			
14	20 0.0 24.1 12.0 5.5 1010							
14	21 0.0 22.6 11.9 5.3 1010							
14	22 0.0 21.1 11.7 5.1 1010	99	9	3	22			
14	23 0.0 20.6 11.5 4.1 1010							
14	24 0.0 20.0 11.3 3.1 1010							
14	25 0.0 19.4 11.1 2.1 1010	99	9	4	1			
14	26 0.0 18.3 11.1 2.2 1010							
14	27 0.0 17.2 11.1 2.4 1010							
14	28 0.0 16.1 11.1 2.6 1010	99	9	4	4			
14	29 0.0 16.7 11.3 2.7 1010							
14	30 0.0 17.2 11.5 2.9 1011							
14	31 0.0 17.8 11.7 3.1 1011	99	9	4	7			
14	32 0.0 20.6 11.7 3.3 1011							
14	33 0.0 23.3 11.7 3.4 1012							
14	34 0.0 26.1 11.7 3.6 1012	99	9	4	10			
14	35 0.0 28.1 12.6 3.6 1011							
14	36 0.0 30.2 13.5 3.6 1011							
14	37 0.0 32.2 14.4 3.6 1011	99	9	4	13			
14	38 0.0 33.0 13.7 3.8 1010							
14	39 0.0 33.7 13.0 3.9 1009							
14	40 0.0 34.4 12.2 4.1 1009	99	9	4	16			
14	41 0.0 32.8 12.6 3.9 1008							
14	42 0.0 31.1 13.0 3.8 1008							
14	43 0.0 29.4 13.3 3.6 1008	99	9	4	19			
14	44 0.0 27.0 13.5 3.6 1008							
14	45 0.0 24.6 13.7 3.6 1009							
14	46 0.0 22.2 13.9 3.6 1009	99	9	4	22			
14	47 0.0 20.9 13.3 3.3 1009							
14	48 0.0 19.6 12.8 2.9 1009							
14	49 0.0 18.3 12.2 2.6 1010	99	9	5	1			
14	50 0.0 18.3 12.2 2.4 1009							
14	51 0.0 18.3 12.2 2.2 1009							
14	52 0.0 18.3 12.2 2.1 1010	99	9	5	4			
14	53 0.0 18.1 12.6 1.4 1010							
14	54 0.0 18.0 13.0 0.7 1011							
14	55 0.0 17.8 13.3 0.0 1012	99	9	5	7			
14	56 0.0 21.1 14.1 1.2 1012							
14	57 0.0 24.4 14.8 2.4 1012							
14	58 0.0 27.8 15.6 3.6 1012	99	9	5	10			
14	59 0.0 30.2 14.6 3.3 1012							
14	60 0.0 32.6 13.7 2.9 1011							
14	61 0.0 35.0 12.8 2.6 1011	99	9	5	13			
14	62 0.0 35.6 12.2 3.1 1010							
14	63 0.0 36.1 11.7 3.6 1010							
14	64 0.0 36.7 11.1 4.1 1009	99	9	5	16			
14	65 0.0 35.4 11.3 3.8 1009							
14	66 0.0 34.1 11.5 3.4 1009							
14	67 0.0 32.8 11.7 3.1 1009	99	9	5	19			
14	68 0.0 30.7 12.0 3.8 1010							
14	69 0.0 28.7 12.4 4.5 1010	99	9	5	22			
14	70 0.0 26.7 12.8 5.1 1011	99	9	5	22			

FIGURE VI-5 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 5

CARD TYPE	DATA							
14	23	0.0	24.8	12.8	4.3	1011		
14	24	0.0	23.0	12.8	3.4	1011		
14	1	0.0	21.1	12.8	2.6	1011	99	9
14	2	0.0	20.9	12.8	2.4	1011	6	1
14	3	0.0	20.7	12.8	2.2	1011		
14	4	0.0	20.6	12.8	2.1	1011	99	9
14	5	0.0	20.7	12.6	1.4	1012	6	4
14	6	0.0	20.9	12.4	0.7	1013		
14	7	0.0	21.1	12.2	0.0	1013	99	9
14	8	0.0	24.1	12.6	1.5	1013	6	7
14	9	0.0	27.0	13.0	3.1	1014		
14	10	0.0	30.0	13.3	4.6	1014	99	9
14	11	0.0	31.9	13.0	4.5	1013	6	10
14	12	0.0	33.7	12.6	4.3	1013		
14	13	0.0	35.6	12.2	4.1	1013	99	9
14	14	0.0	36.7	11.7	4.5	1012	6	13
14	15	0.0	37.8	11.1	4.8	1012		
14	16	0.0	38.9	10.6	5.1	1011	99	9
14	17	0.0	37.0	10.7	5.1	1011	6	16
14	18	0.0	35.2	10.9	5.1	1011		
14	19	0.0	33.3	11.1	5.1	1011	99	9
14	20	0.0	31.3	11.5	4.8	1012	6	19
14	21	0.0	29.3	11.9	4.5	1012		
14	22	0.0	27.2	12.2	4.1	1012	99	9
14	23	0.0	25.6	12.4	3.4	1012	6	22
14	24	0.0	23.9	12.6	2.7	1012		
14	1	0.0	22.2	12.8	2.1	1013	99	9
14	2	0.0	20.9	12.8	2.4	1011	7	1
14	3	0.0	20.7	12.8	2.2	1011		
14	4	0.0	20.6	12.8	2.1	1011	99	9
14	5	0.0	20.7	12.6	1.4	1012	7	4
14	6	0.0	20.9	12.4	0.7	1013		
14	7	0.0	21.1	12.2	0.0	1013	99	9
14	8	0.0	24.1	12.6	1.5	1013	7	7
14	9	0.0	27.0	13.0	3.1	1014		
14	10	0.0	30.0	13.3	4.6	1014	99	9
14	11	0.0	31.9	13.0	4.5	1013	7	
14	12	0.0	33.7	12.6	4.3	1013		
14	13	0.0	35.6	12.2	4.1	1013	99	9
14	14	0.0	36.7	11.7	4.5	1012	7	13
14	15	0.0	37.8	11.1	4.8	1012		
14	16	0.0	38.9	10.6	5.1	1011	99	9
14	17	0.0	37.0	10.7	5.1	1011	7	16
14	18	0.0	35.2	10.9	5.1	1011		
14	19	0.0	33.3	11.1	5.1	1011	99	9
14	20	0.0	31.3	11.5	4.8	1012	7	19
14	21	0.0	29.3	11.9	4.5	1012		
14	22	0.0	27.2	12.2	4.1	1012	99	9
14	23	0.0	25.6	12.4	3.4	1012	7	22
14	24	0.0	23.9	12.6	2.7	1012		
	ALL							
	UNUSED							
	DATA							
	WOULD							
	NOW							
	BE							
	SKIPPED							

FIGURE VI-5 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION DATA PAGE 6

CARD TYPE	DATA														
1	SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION														
1	STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY.. PLOT OPTION 1 & 2														
1a	0	1													
15	1	0	0												
16	2														
18a	8	248	12	248	24										
18b	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
18c	7	27.8													30
18d		34.		6.8		8.3									
18d		26.8		7.6		8.5									
18d		32.2		7.2		8.4									
18d		35.2		6.5		7.2									
18d		37.0		6.5		7.5									
18d		40.5		6.4		7.9									
18d		39.0		5.9		6.8									
16	1														
17a	8	14	20	26											
17b	248	1	248	24											
16	999														
15	0	1	0												
19	2														
21a	8	248													
21b	18	16	17	18	19	.20	21	22	23	24	25	26	27	52	53
21b	55	196	41												54
21c	6	27.8													
21d		34.		6.8		8.3									
21d		32.2		7.2		8.4									
21d		35.2		6.5		7.2									
21d		37.0		6.5		7.5									
21d		40.5		6.4		7.9									
21d		39.0		5.9		6.8									
19	999														
15	0	0	0												
26	ALL														
1	UNUSED														
1	DATA														
1	WOULD														
1	NOW														
1	BE														
1	SKIPPED														
ER															
1	END DF														
1	JOB														
1	0	0													

FIGURE VI-6
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 1

HYDRAULICS SIMULATION

TITLE * SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** MODEL DEMONSTRATION
* STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY
RUN TIME AND DATE * THU, FEB 27 1986 * 17:48:45

QUALITY SIMULATION

TITLE * SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
* STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY
RUN TIME AND DATE * FRI, FEB 28 1986 * 12:27:17

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

RESOURCE MANAGEMENT ASSOC. INC.
LAFAYETTE, CALIF.

SIMULATION BEGINS ON DAY	244
NUMBER OF BOUNDARY CONDITIONS	1
DAYS OF SIMULATION PER CONDITION	6
QUALITY TIME STEPS PER DAY	24
TYPE OF INTEGRATION	2 STEP RUNGE-KUTTA
QUALITY TIME STEPS PER TIDAL CYCLE	24
HYDRAULIC INTERFACE UNIT	12
B. B./DYN. QUALITY INTERFACE UNIT	0
HYDRAULIC SCRATCH FILE # 1	9
QUALITY OUTPUT FILE	14
HYDRAULIC SCRATCH FILE # 2	8
METEOROLOGICAL DATA OUTPUT FILE	11
DIAGNOSTICS OUTPUT FILE	13

THE FOLLOWING CONSTITUENTS ARE BEING MODELED

TDS
NITRATE N
PHOSPHATE P
TOTAL COLIFORM
DETROITUS
CARBON BOD
AMMONIA N
OXYGEN
TEMPERATURE
ALOAE 1
ALOAE 1

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 2

BAY FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

REBOURCE MANAGEMENT ASSOC. INC.
LAFAYETTE, CALIF.

INITIAL QUALITY CONDITIONS												
JUN TO JUN		TDB MG/L	NO3 N MG/L	PO4 P MG/L	T COL NO/100ML	DETROIT MG/L	C BOD MG/L	NH3 N MG/L	D O MG/L	TEMP C	ALGAE 1 MG/L	ALGAE 2 MG/L
1	1	392.	0.03	0.04	0.10E+01	0.35	0.98	0.03	8.67	20.9	0.380	0.080
2	2	304.	0.04	0.04	0.10E+01	0.18	0.47	0.04	8.70	20.8	0.450	0.090
3	3	399.	0.01	0.04	0.10E+01	0.23	0.51	0.03	8.98	20.9	0.570	0.160
4	4	237.	0.01	0.04	0.10E+01	0.15	0.28	0.03	9.02	20.8	0.490	0.170
5	5	177.	0.02	0.04	0.10E+01	0.13	0.23	0.03	9.02	20.8	0.450	0.160
6	6	129.	0.03	0.04	0.10E+01	0.12	0.21	0.04	8.91	20.7	0.400	0.140
7	7	103.	0.03	0.04	0.10E+01	0.12	0.20	0.04	8.85	20.7	0.370	0.140
8	8	107.	0.05	0.05	0.10E+01	0.15	0.26	0.05	8.65	20.6	0.340	0.100
9	9	89.	0.05	0.05	0.10E+01	0.16	0.29	0.05	8.63	20.6	0.310	0.100
10	10	88.	0.06	0.05	0.10E+01	0.17	0.33	0.06	8.64	20.6	0.310	0.110
11	11	87.	0.06	0.05	0.10E+01	0.18	0.33	0.06	8.70	20.7	0.370	0.160
12	12	94.	0.04	0.06	0.10E+01	0.16	0.17	0.04	8.70	20.7	0.340	0.170
13	13	104.	0.04	0.07	0.10E+01	0.19	0.18	0.05	8.45	20.6	0.340	0.200
14	14	115.	0.04	0.09	0.10E+01	0.22	0.15	0.05	8.32	20.6	0.350	0.260
15	15	139.	0.06	0.11	0.10E+01	0.31	0.16	0.06	8.20	20.7	0.380	0.300
16	16	158.	0.06	0.13	0.10E+01	0.37	0.16	0.06	8.09	20.7	0.400	0.370
17	17	182.	0.07	0.16	0.10E+01	0.45	0.16	0.07	7.93	20.7	0.440	0.480
18	18	303.	0.13	0.29	0.10E+01	0.83	0.22	0.11	7.89	20.7	0.500	0.480
19	19	391.	0.18	0.37	0.10E+01	1.13	0.32	0.14	7.82	20.9	0.610	0.600
20	20	498.	0.25	0.47	0.10E+01	1.50	0.47	0.18	7.51	21.0	0.770	0.750
21	21	619.	0.32	0.55	0.10E+01	1.91	0.74	0.23	7.00	21.3	1.000	0.920
22	22	640.	0.32	0.55	0.10E+01	1.96	0.88	0.24	6.81	21.4	1.110	0.960
23	23	723.	0.37	0.59	0.10E+01	2.22	1.18	0.26	6.56	21.5	1.340	1.040
24	24	741.	0.36	0.56	0.10E+01	2.25	1.41	0.26	6.18	21.6	1.520	1.120
25	25	741.	0.36	0.56	0.10E+01	2.25	1.41	0.26	6.18	21.6	1.520	1.120
26	26	758.	0.37	0.54	0.10E+01	2.30	1.64	0.26	5.82	21.7	1.680	1.160
27	27	766.	0.40	0.55	0.10E+01	2.37	1.75	0.27	5.69	21.7	1.660	1.090
28	28	766.	0.40	0.55	0.10E+01	2.37	1.75	0.27	5.69	21.7	1.660	1.090
29	29	785.	0.41	0.50	0.10E+01	2.44	2.31	0.26	5.99	21.8	2.010	1.190
30	30	791.	0.43	0.45	0.10E+01	2.45	2.87	0.25	7.62	22.0	2.390	1.380
31	31	623.	0.41	0.49	0.10E+01	1.65	1.04	0.18	5.00	21.0	0.970	0.610
32	32	623.	0.41	0.47	0.10E+01	1.11	0.35	0.13	4.13	20.5	0.400	0.320
33	33	507.	0.41	0.47	0.10E+01	0.60	0.11	0.08	5.08	20.4	0.240	0.250
34	34	419.	0.33	0.40	0.10E+01	1.62	3.17	0.04	8.90	22.1	2.680	0.340
35	35	801.	0.52	0.05	0.10E+01	1.40	3.19	0.05	8.80	22.1	2.630	0.270
36	36	801.	0.56	0.07	0.10E+01	1.51	3.35	0.04	8.59	22.1	2.550	0.290
37	37	801.	0.62	0.07	0.10E+01	1.49	3.45	0.04	8.47	22.1	2.510	0.280
38	38	122.	0.04	0.10	0.10E+01	0.24	0.13	0.05	8.26	20.6	0.350	0.210
39	39	201.	0.08	0.18	0.10E+01	0.50	0.17	0.07	7.57	20.7	0.420	0.340
40	40	100.	0.02	0.06	0.10E+01	0.20	0.14	0.04	9.15	20.9	0.460	0.350
41	41	121.	0.00	0.03	0.10E+01	0.06	0.10	0.02	9.28	21.0	0.540	0.340
42	42	109.	0.07	0.04	0.10E+01	0.08	0.32	0.05	8.55	20.6	0.290	0.050
43	43	106.	0.08	0.05	0.10E+01	0.09	0.39	0.06	8.49	20.6	0.270	0.030
44	44	88.	0.07	0.05	0.10E+01	0.09	0.39	0.06	8.52	20.6	0.260	0.040
45	45	75.	0.09	0.05	0.10E+01	0.07	0.55	0.07	8.38	20.5	0.180	0.000
46	46	80.	0.07	0.05	0.10E+01	0.07	0.60	0.08	8.39	20.5	0.180	0.010
47	47	77.	0.08	0.04	0.10E+01	0.07	0.44	0.06	8.29	20.5	0.190	0.030
48	48	71.	0.06	0.04	0.10E+01	0.04	0.15	0.04	8.32	20.7	0.230	0.030
49	49	73.	0.07	0.04	0.10E+01	0.05	0.19	0.04	8.14	20.7	0.180	0.020
50	50	67.	0.06	0.04	0.10E+01	0.03	0.07	0.02	8.04	20.8	0.150	0.020
51	51	81.	0.10	0.03	0.10E+01	0.11	0.98	0.10	8.47	20.2	0.140	0.000
52	52	79.	0.09	0.05	0.10E+01	0.09	0.75	0.08	8.35	20.2	0.150	0.000
53	53	80.	0.09	0.05	0.10E+01	0.10	0.89	0.09	8.36	20.1	0.130	0.000
54	54	80.	0.09	0.05	0.10E+01	0.06	0.89	0.09	8.41	20.1	0.140	0.000
55	55	80.	0.09	0.05	0.10E+01	0.09	0.75	0.08	8.45	20.3	0.170	0.000
56	56	80.	0.09	0.05	0.10E+01	0.07	0.44	0.06	8.32	20.7	0.230	0.030
57	57	71.	0.06	0.04	0.10E+01	0.04	0.15	0.04	8.14	20.7	0.180	0.020
58	58	73.	0.07	0.04	0.10E+01	0.05	0.19	0.04	8.04	20.8	0.150	0.020
59	59	67.	0.06	0.04	0.10E+01	0.03	0.07	0.02	8.04	20.4	0.140	0.000
60	60	81.	0.10	0.03	0.10E+01	0.11	0.98	0.10	8.47	20.2	0.150	0.000
61	61	79.	0.09	0.05	0.10E+01	0.09	0.75	0.08	8.35	20.2	0.130	0.000
62	62	80.	0.09	0.05	0.10E+01	0.10	0.89	0.09	8.36	20.1	0.130	0.000
63	63	80.	0.09	0.05	0.10E+01	0.10	0.85	0.09	8.35	20.1	0.130	0.000
64	64	80.	0.09	0.05	0.10E+01	0.10	0.88	0.09	8.35	20.1	0.130	0.000
65	65	80.	0.09	0.05	0.10E+01	0.10	0.89	0.10	8.52	20.4	0.150	0.000
66	66	80.	0.09	0.05	0.10E+01	0.10	0.89	0.10	8.47	20.2	0.150	0.000
67	67	80.	0.09	0.05	0.10E+01	0.09	0.77	0.09	8.40	20.1	0.150	0.000
68	68	80.	0.09	0.05	0.10E+01	0.09	0.86	0.09	8.41	20.1	0.140	0.000
69	69	80.	0.09	0.05	0.10E+01	0.09	0.83	0.09	8.36	20.1	0.140	0.000
70	70	80.	0.09	0.05	0.10E+01	0.09	0.87	0.09	8.35	20.1	0.130	0.000
71	71	81.	0.10	0.05	0.10E+01	0.06	0.80	0.09	8.45	20.3	0.170	0.000

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 3

72	72	80.	0.09	0.05	0.10E+01	0.07	0.74	0.09	8.38	20.3	0.160	0.000
73	73	80.	0.09	0.05	0.10E+01	0.07	0.80	0.09	8.39	20.3	0.150	0.000
74	74	80.	0.09	0.05	0.10E+01	0.07	0.82	0.09	8.38	20.2	0.150	0.010
75	75	80.	0.09	0.05	0.10E+01	0.07	0.85	0.09	8.36	20.2	0.140	0.010
76	76	80.	0.09	0.05	0.10E+01	0.11	0.86	0.09	8.35	20.2	0.130	0.000
80	80	75.	0.10	0.05	0.10E+01	0.24	0.74	0.09	8.39	20.4	0.150	0.030
81	81	83.	0.09	0.05	0.10E+01	0.15	0.74	0.09	8.39	20.3	0.170	0.020
82	82	80.	0.09	0.05	0.10E+01	0.08	0.79	0.09	8.39	20.3	0.150	0.000
83	83	81.	0.09	0.05	0.10E+01	0.06	0.80	0.09	8.39	20.3	0.160	0.000
84	84	77.	0.09	0.05	0.10E+01	0.36	0.72	0.08	8.51	20.4	0.180	0.090
85	85	77.	0.09	0.05	0.10E+01	0.30	0.78	0.08	8.45	20.4	0.160	0.060
86	86	77.	0.09	0.05	0.10E+01	0.34	0.80	0.08	8.45	20.3	0.170	0.080
87	87	76.	0.09	0.05	0.10E+01	0.36	0.81	0.08	8.47	20.3	0.180	0.080
88	88	72.	0.02	0.02	0.10E+01	0.13	0.35	0.05	9.66	21.3	0.530	0.390
89	89	37.	0.12	0.05	0.10E+01	3.33	1.01	0.03	8.26	19.9	0.080	0.000
90	90	76.	0.09	0.04	0.10E+01	0.25	0.50	0.07	8.55	20.6	0.230	0.060
91	91	76.	0.08	0.05	0.10E+01	0.29	0.51	0.07	8.61	20.6	0.240	0.080
92	92	76.	0.09	0.05	0.10E+01	0.31	0.66	0.08	8.55	20.5	0.200	0.070
93	93	76.	0.09	0.05	0.10E+01	0.32	0.77	0.08	8.49	20.4	0.170	0.070
95	95	72.	0.06	0.04	0.10E+01	0.16	0.28	0.05	8.78	20.8	0.330	0.060
96	96	78.	0.09	0.05	0.10E+01	0.24	0.44	0.07	8.39	20.7	0.250	0.070
97	97	68.	0.08	0.03	0.10E+01	0.20	0.40	0.06	8.72	20.8	0.270	0.030
98	98	68.	0.07	0.03	0.10E+01	0.17	0.30	0.06	8.92	21.0	0.360	0.080
99	99	88.	0.02	0.05	0.10E+01	0.16	0.14	0.04	9.34	20.9	0.460	0.360
100	100	61.	0.02	0.02	0.10E+01	0.11	0.16	0.04	9.38	21.2	0.490	0.110
101	101	95.	0.00	0.05	0.10E+01	0.15	0.08	0.02	9.68	21.0	0.490	0.560
102	102	139.	0.00	0.09	0.10E+01	0.26	0.08	0.03	9.99	21.2	0.600	0.930
103	103	221.	0.04	0.18	0.10E+01	0.53	0.14	0.06	9.60	21.2	0.700	1.010
104	104	585.	0.12	0.48	0.10E+01	1.43	0.61	0.18	9.00	21.5	1.390	1.970
105	105	524.	0.04	0.43	0.10E+01	1.12	0.42	0.14	10.92	21.7	1.410	2.390
110	110	95.	0.00	0.03	0.10E+01	0.06	0.06	0.02	9.13	21.1	0.380	0.230
111	111	112.	0.00	0.04	0.10E+01	0.06	0.07	0.02	8.94	21.0	0.310	0.190
112	112	107.	0.00	0.04	0.10E+01	0.06	0.07	0.02	8.87	21.0	0.290	0.180
113	113	100.	0.01	0.04	0.10E+01	0.09	0.11	0.03	9.23	20.8	0.430	0.230
114	114	91.	0.00	0.04	0.10E+01	0.07	0.08	0.02	9.17	21.0	0.380	0.230
115	115	91.	0.01	0.04	0.10E+01	0.09	0.11	0.03	9.20	20.9	0.410	0.240
116	116	94.	0.02	0.06	0.10E+01	0.14	0.17	0.04	9.05	20.7	0.420	0.210
117	117	90.	0.01	0.05	0.10E+01	0.09	0.08	0.03	9.14	20.9	0.400	0.250
118	118	82.	0.00	0.04	0.10E+01	0.04	0.04	0.02	8.79	21.1	0.240	0.180
119	119	87.	0.00	0.04	0.10E+01	0.07	0.08	0.02	9.20	21.0	0.380	0.240
121	121	86.	0.00	0.04	0.10E+01	0.04	0.04	0.01	8.77	21.1	0.230	0.170
122	122	76.	0.00	0.03	0.10E+01	0.02	0.02	0.01	8.39	21.1	0.100	0.090
123	123	67.	0.00	0.05	0.10E+01	0.06	0.04	0.02	8.81	20.8	0.320	0.230
124	124	92.	0.01	0.06	0.10E+01	0.10	0.07	0.03	8.97	20.7	0.390	0.240
125	125	105.	0.02	0.07	0.10E+01	0.15	0.10	0.04	8.72	20.6	0.390	0.230
126	126	91.	0.00	0.05	0.10E+01	0.08	0.05	0.02	8.91	20.7	0.380	0.240
127	127	137.	0.04	0.11	0.10E+01	0.27	0.11	0.03	8.07	20.5	0.340	0.240
128	128	152.	0.04	0.13	0.10E+01	0.29	0.09	0.03	8.01	20.5	0.350	0.280
129	129	184.	0.04	0.17	0.10E+01	0.35	0.09	0.06	7.99	20.5	0.390	0.360
130	130	93.	0.00	0.06	0.10E+01	0.08	0.04	0.02	8.79	20.6	0.340	0.240
131	131	166.	0.03	0.15	0.10E+01	0.28	0.06	0.05	8.27	20.5	0.390	0.350
135	135	356.	0.12	0.35	0.10E+01	0.88	0.17	0.11	6.74	20.8	0.540	0.630
136	136	357.	0.16	0.35	0.10E+01	1.00	0.23	0.12	6.20	20.8	0.540	0.560
140	140	100.	0.00	0.07	0.10E+01	0.09	0.04	0.02	8.66	20.6	0.320	0.250
141	141	168.	0.02	0.15	0.10E+01	0.27	0.06	0.04	8.51	20.5	0.420	0.390
142	142	192.	0.01	0.14	0.10E+01	0.27	0.08	0.04	9.05	20.4	0.610	0.490
143	143	112.	0.02	0.09	0.10E+01	0.12	0.17	0.02	9.21	20.4	0.420	0.390
144	144	354.	0.10	0.08	0.10E+01	0.49	0.69	0.04	9.01	21.0	1.180	0.360
145	145	783.	0.38	0.07	0.10E+01	1.22	2.09	0.07	7.93	21.9	2.310	0.270
146	146	663.	0.16	0.06	0.10E+01	0.88	1.34	0.07	9.08	21.7	2.190	0.330
147	147	801.	0.46	0.07	0.10E+01	1.32	2.50	0.06	8.11	22.0	2.430	0.280
148	148	312.	0.07	0.08	0.10E+01	0.33	0.34	0.03	10.20	21.2	1.500	0.640
149	149	472.	0.15	0.04	0.10E+01	0.49	0.75	0.04	11.46	21.8	2.410	0.720
150	150	793.	0.57	0.07	0.10E+01	1.43	3.13	0.05	8.42	22.1	2.490	0.290
151	151	128.	0.00	0.07	0.10E+01	0.10	0.05	0.02	8.94	21.3	0.610	0.410
37	38	831.	0.34	0.41	0.10E+01	2.37	2.93	0.24	9.43	22.1	2.810	1.530
39	40	805.	0.42	0.43	0.10E+01	2.43	2.97	0.24	8.28	22.1	2.350	1.420
44	46	813.	0.48	0.39	0.10E+01	2.39	3.41	0.25	8.12	22.2	2.760	1.330
158	158	801.	0.48	0.31	0.10E+01	1.94	3.12	0.19	8.73	22.1	2.650	0.980
159	159	798.	0.50	0.08	0.10E+01	1.11	2.87	0.06	9.08	22.1	2.740	0.510
160	160	807.	0.70	0.11	0.10E+01	1.36	3.64	0.05	7.71	23.4	0.860	0.890
161	161	813.	0.72	0.08	0.10E+01	1.34	3.85	0.05	7.89	23.3	0.810	0.840
162	162	801.	0.63	0.07	0.10E+01	1.52	3.54	0.04	8.40	22.1	2.490	0.280
163	163	800.	0.69	0.08	0.10E+01	1.55	3.77	0.03	8.09	21.7	2.370	0.260

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 4

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

RESOURCE MANAGEMENT ASSOC. INC.
LAFAYETTE, CALIF.

EXCHANGE CONDITIONS DURING HYDROLOGIC CYCLE 1												
JUN	HOUR	TDS MG/L	NOD N MG/L	P04 P MG/L	T COL NO/100ML	DETTRIT MG/L	C BOD MG/L	NH3 N MG/L	OXY MG/L	TEMP C	ALG 1 MG/L	ALG 2 MG/L
1	1	1000.	0.05	0.04	0.50E+03	0.60	2.00	0.03	8.80	21.0	1.500	0.100
1	25	1000.	0.05	0.04	0.50E+03	0.60	2.00	0.03	8.80	21.0	1.500	0.100
INFLOW CONDITIONS DURING HYDRAULIC CYCLE 1												
JUN	INFLOW CFB	TDS MG/L	NOD N MG/L	P04 P MG/L	T COL NO/100ML	DETTRIT MG/L	C BOD MG/L	NH3 N MG/L	OXY MG/L	TEMP C	ALG 1 MG/L	ALG 2 MG/L
89	0.0	50.	0.11	0.05	0.50E+03	0.10	1.00	0.05	8.30	20.0	0.220	0.020
65	0.0	80.	0.09	0.05	0.50E+03	0.10	1.00	0.10	8.30	20.0	0.210	0.010
163	0.0	800.	0.75	0.08	0.10E+04	1.60	5.50	0.03	7.70	22.0	4.500	0.500
158	0.0	1000.	0.35	7.00	0.10E+03	15.00	23.00	4.00	8.00	24.0	1.000	25.000

SYSTEM COEFFICIENTS FOR STOCKTON MODEL (SET IN BLOCK DATA)

NITROGEN FRACTION OF ALGAE	0.080
PHOSPHORUS FRACTION OF ALGAE	0.012
NITROGEN FRACTION OF DETRITUS	0.080
PHOSPHORUS FRACTION OF DETRITUS	0.012
DETRITUS SETTLING RATE	0.250
BOD DECAY RATE	0.200
DETRITUS DECAY RATE	0.040
AMMONIA DECAY RATE	0.100
COLIFORM DIEDOFF RATE	1.000
TEMPERATURE COEFF FOR BOD DECAY	1.047
TEMPERATURE COEFF FOR AMMONIA DECAY	1.022
TEMPERATURE COEFF FOR COLIFORM DIEOFF	1.040
TEMPERATURE COEFF FOR DETRITUS DECAY	1.023
OXYGEN CONSUMED WITH AMMONIA DECAY	4.600
OXYGEN CONSUMED WITH DETRITUS DECAY	1.600
OXYGEN PRODUCED WITH PHOTOSYNTHESIS	1.600
OXYGEN CONSUMED WITH ALGAL RESPIRATION	1.600
DETRITUS LIGHT EXTINCTION COEF	0.200
ALGAL LIGHT EXTINCTION COEFF	0.200
MAXIMUM GROWTH RATE FOR ALGAE 1	2.000
MAXIMUM GROWTH RATE FOR ALGAE 2	2.500
RESPIRATION RATE FOR ALGAE 1	0.200
RESPIRATION RATE FOR ALGAE 1	0.250
LIGHT HALF SATURATION FOR ALGAE 1	0.002
LIGHT HALF SATURATION FOR ALGAE 2	0.006
NITROGEN HALF SATURATION FOR ALGAE 1	0.050
NITROGEN HALF SATURATION FOR ALGAE 2	0.200
PHOSPHOROUS HALF SATURATION FOR ALGAE 1	0.020
PHOSPHOROUS HALF SATURATION FOR ALGAE 2	0.050
SETTLING RATE FOR ALGAE 1	0.500
SETTLING RATE FOR ALGAE 2	0.150
ALGAL MORTALITY RATE	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

SPATIAL VARYING SYSTEM COEFFICIENTS							FORCED AERATION			
JUN TO JUN	IX LIGHT	N BINK	P BINK	D BINK	REAERATION		FORCED AERATION			
	DEPTH	METERS	MG/M2/DAY	MG/M2/DAY	MG/M2/DAY	1/DAY	1/DAY	LB/MILE/DAY	LB/MSF/DAY	LB/NODE/DAY
1	19	2.00	0.0	0.0	0.0	0.00	5.00	0.0	0.0	0.0
20	25	2.00	0.0	0.0	0.0	0.00	5.00	500.0	0.0	0.0
TOTAL FORCED AERATION FOR NODES	20 TO 25	= 2490.529 POUNDS / DAY								
26	29	2.00	0.0	0.0	0.0	0.00	5.00	0.0	0.0	0.0
30	31	2.00	0.0	0.0	0.0	0.00	5.00	0.0	0.0	500.0
TOTAL FORCED AERATION FOR NODES	30 TO 31	= 1000.000 POUNDS / DAY								
32	163	2.00	0.0	0.0	0.0	0.00	5.00	0.0	0.0	0.0

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 5

FLOW AND WIND (10 MPH)	INDUCED REAERATION COEFFICIENT BY NODES: 1/DAY
1 0.040 0.141	2 0.060 0.186
6 0.078 0.193	7 0.073 0.178
11 0.075 0.210	12 0.101 0.192
16 0.066 0.175	17 0.070 0.178
21 0.066 0.185	22 0.068 0.195
26 0.043 0.167	27 0.041 0.178
31 0.016 0.192	32 0.000 0.000
36 0.369 0.539	37 0.240 0.438
41 0.066 0.192	42 0.079 0.192
46 0.211 0.367	47 0.000 0.000
51 0.059 0.165	52 0.046 0.155
56 0.038 0.150	57 0.046 0.175
61 0.074 0.249	62 0.089 0.296
66 0.128 0.341	67 0.167 0.411
71 0.101 0.283	72 0.112 0.295
76 0.091 0.177	77 0.000 0.000
81 0.087 0.197	82 0.097 0.200
86 0.104 0.246	87 0.230 0.322
91 0.044 0.212	92 0.042 0.241
96 0.072 0.228	97 0.057 0.210
101 0.084 0.323	102 0.112 0.405
106 0.000 0.000	107 0.000 0.000
111 0.113 0.359	112 0.075 0.282
116 0.100 0.279	117 0.127 0.336
121 0.134 0.368	122 0.040 0.351
126 0.078 0.211	127 0.104 0.146
131 0.153 0.214	132 0.000 0.000
136 0.125 0.221	137 0.000 0.000
141 0.132 0.251	142 0.221 0.329
146 0.276 0.398	147 0.159 0.356
151 0.000 0.401	152 0.000 0.000
156 0.000 0.000	157 0.000 0.000
161 0.000 0.000	162 0.471 0.370
	3 0.058 0.168
	8 0.075 0.153
	13 0.074 0.192
	18 0.062 0.181
	23 0.056 0.189
	28 0.042 0.153
	33 0.296 0.409
	38 0.222 0.438
	43 0.065 0.232
	48 0.060 0.398
	53 0.064 0.168
	58 0.030 0.156
	63 0.101 0.282
	68 0.153 0.374
	73 0.095 0.263
	78 0.000 0.000
	83 0.119 0.212
	88 0.483 0.533
	93 0.082 0.267
	98 0.093 0.257
	103 0.100 0.437
	108 0.000 0.000
	113 0.073 0.215
	118 0.071 0.367
	123 0.077 0.353
	128 0.071 0.175
	133 0.000 0.000
	138 0.000 0.000
	143 0.143 0.244
	148 0.450 0.567
	153 0.000 0.000
	158 0.205 0.368
	163 0.627 0.830
	4 0.061 0.166
	9 0.066 0.143
	14 0.041 0.134
	19 0.071 0.194
	24 0.055 0.180
	29 0.012 0.135
	34 0.338 0.459
	39 0.206 0.439
	44 0.228 0.338
	49 0.073 0.485
	54 0.075 0.179
	59 0.025 0.155
	64 0.098 0.258
	69 0.114 0.335
	74 0.077 0.233
	79 0.000 0.000
	84 0.045 0.204
	89 0.284 0.398
	94 0.000 0.000
	99 0.076 0.245
	104 0.170 0.438
	109 0.000 0.000
	114 0.112 0.298
	119 0.141 0.411
	124 0.083 0.189
	129 0.111 0.205
	134 0.000 0.000
	139 0.000 0.000
	144 0.170 0.300
	149 0.381 0.705
	154 0.000 0.000
	159 0.239 0.369
	5 0.098 0.212
	10 0.077 0.143
	15 0.063 0.134
	20 0.082 0.211
	25 0.063 0.182
	30 0.013 0.125
	35 0.350 0.488
	40 0.188 0.439
	45 0.208 0.367
	50 0.400 0.320
	55 0.061 0.169
	60 0.000 0.000
	65 0.129 0.222
	70 0.118 0.225
	75 0.099 0.201
	80 0.064 0.211
	85 0.072 0.213
	90 0.073 0.216
	95 0.064 0.201
	100 0.090 0.375
	105 0.164 0.545
	110 0.398 0.699
	115 0.158 0.289
	120 0.000 0.000
	125 0.069 0.182
	130 0.105 0.214
	135 0.119 0.254
	140 0.138 0.262
	145 0.113 0.313
	150 0.280 0.376
	155 0.000 0.000
	160 0.000 0.000

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 6

SAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

RESOURCE MANAGEMENT ASSOC. INC.
LAFAYETTE, CALIF.

JUN	TDB MO/L	RESULTS FOR DAY 246, HOUR 12									
		NO3 N MO/L	PO4 P MO/L	T COL NO/100ML	DETROIT MO/L	C BOD MO/L	NH3 N MO/L	D O MO/L	TEMP C	ALgae 1 MO/L	ALgae 2 MO/L
1	915.	0.04	0.04	0.38E+03	0.54	1.73	0.03	8.80	21.2	1.439	0.101
2	757.	0.04	0.04	0.23E+03	0.44	1.31	0.03	8.75	21.3	1.254	0.098
3	697.	0.04	0.04	0.19E+03	0.41	1.16	0.03	8.75	21.4	1.189	0.100
4	564.	0.03	0.04	0.10E+03	0.33	0.85	0.03	8.73	21.4	1.023	0.103
5	462.	0.03	0.04	0.57E+02	0.27	0.64	0.03	8.75	21.5	0.902	0.106
6	379.	0.03	0.05	0.33E+02	0.23	0.50	0.03	8.77	21.5	0.805	0.108
7	317.	0.04	0.05	0.20E+02	0.20	0.41	0.04	8.78	21.5	0.723	0.110
8	249.	0.05	0.05	0.13E+02	0.18	0.35	0.04	8.73	21.4	0.600	0.099
9	201.	0.06	0.05	0.85E+01	0.16	0.30	0.04	8.69	21.4	0.514	0.102
10	170.	0.06	0.06	0.69E+01	0.16	0.27	0.04	8.68	21.4	0.463	0.106
11	150.	0.06	0.06	0.70E+01	0.16	0.26	0.05	8.68	21.4	0.437	0.112
12	142.	0.07	0.07	0.60E+01	0.17	0.24	0.05	8.68	21.4	0.422	0.125
13	145.	0.07	0.08	0.41E+01	0.20	0.21	0.05	8.65	21.5	0.412	0.148
14	156.	0.08	0.10	0.22E+01	0.25	0.19	0.05	8.59	21.5	0.405	0.173
15	175.	0.09	0.12	0.12E+01	0.30	0.19	0.06	8.52	21.5	0.413	0.202
16	182.	0.10	0.13	0.99E+00	0.33	0.20	0.06	8.50	21.6	0.420	0.213
17	207.	0.11	0.15	0.71E+00	0.39	0.21	0.07	8.44	21.6	0.454	0.248
18	265.	0.14	0.19	0.45E+00	0.52	0.26	0.08	8.29	21.7	0.525	0.309
19	335.	0.18	0.24	0.39E+00	0.67	0.34	0.09	8.11	21.8	0.619	0.378
20	401.	0.22	0.29	0.47E+00	0.81	0.42	0.11	7.94	21.9	0.717	0.443
21	482.	0.27	0.34	0.83E+00	0.98	0.56	0.13	7.69	22.0	0.858	0.524
22	554.	0.31	0.38	0.15E+01	1.13	0.73	0.15	7.44	22.0	1.015	0.606
23	616.	0.36	0.41	0.27E+01	1.26	0.92	0.16	7.20	22.1	1.190	0.686
24	664.	0.39	0.44	0.46E+01	1.36	1.13	0.18	6.97	22.2	1.373	0.762
25	700.	0.42	0.45	0.79E+01	1.44	1.39	0.19	6.79	22.2	1.593	0.849
26	725.	0.45	0.47	0.14E+02	1.53	1.69	0.20	6.54	22.2	1.833	0.932
27	743.	0.47	0.47	0.26E+02	1.62	2.13	0.21	6.46	22.2	2.197	1.064
28	762.	0.49	0.46	0.51E+02	1.72	2.76	0.22	6.61	22.2	2.750	1.223
29	688.	0.48	0.46	0.21E+02	1.41	1.67	0.18	6.29	21.9	1.714	0.795
30	595.	0.45	0.46	0.34E+01	1.07	0.70	0.13	6.45	21.6	0.782	0.409
31	517.	0.41	0.44	0.36E+00	0.78	0.31	0.10	7.47	21.5	0.422	0.266
33	601.	0.57	0.10	0.28E+03	1.46	4.15	0.06	8.32	22.6	4.743	0.627
34	800.	0.60	0.08	0.37E+03	1.46	4.37	0.05	8.43	22.6	4.830	0.560
35	800.	0.63	0.07	0.48E+03	1.49	4.65	0.04	8.47	22.6	4.858	0.539
36	800.	0.65	0.07	0.57E+03	1.52	4.86	0.04	8.57	22.5	4.918	0.540
37	742.	0.44	0.46	0.21E+02	1.56	2.05	0.21	7.31	22.5	2.304	1.147
38	772.	0.46	0.47	0.39E+02	1.69	2.72	0.23	7.55	22.7	2.918	1.389
39	790.	0.48	0.46	0.65E+02	1.79	3.31	0.24	7.64	22.7	3.427	1.525
40	800.	0.51	0.40	0.11E+03	1.82	3.79	0.22	7.77	22.8	3.916	1.498
41	169.	0.08	0.12	0.11E+01	0.29	0.18	0.03	8.55	21.6	0.407	0.198
42	225.	0.12	0.16	0.51E+00	0.43	0.22	0.07	8.39	21.7	0.466	0.265
43	204.	0.11	0.13	0.45E+00	0.38	0.21	0.06	8.30	21.7	0.473	0.271
44	779.	0.50	0.42	0.81E+02	1.76	3.26	0.22	7.08	22.4	3.331	1.314
45	793.	0.52	0.37	0.12E+03	1.78	3.72	0.20	7.52	22.6	3.864	1.346
46	802.	0.53	0.33	0.15E+03	1.78	4.02	0.19	7.81	22.6	4.213	1.338
48	693.	0.38	0.47	0.19E+01	1.32	0.90	0.18	7.69	22.5	1.234	0.799
49	736.	0.42	0.47	0.63E+01	1.40	1.34	0.19	7.62	22.6	1.630	0.933
50	364.	0.02	0.04	0.20E+02	0.20	0.43	0.03	8.96	21.8	0.924	0.113
51	572.	0.04	0.04	0.12E+03	0.33	0.91	0.03	8.67	21.4	0.998	0.089
52	404.	0.03	0.04	0.49E+02	0.24	0.61	0.04	8.63	21.4	0.758	0.079
53	284.	0.06	0.05	0.23E+02	0.18	0.44	0.04	8.64	21.4	0.598	0.072
54	187.	0.07	0.05	0.15E+02	0.13	0.37	0.05	8.61	21.3	0.448	0.052
55	129.	0.08	0.05	0.21E+02	0.10	0.38	0.05	8.58	21.2	0.357	0.033
56	98.	0.09	0.05	0.24E+02	0.08	0.36	0.05	8.54	21.1	0.289	0.022
57	80.	0.08	0.04	0.38E+01	0.05	0.20	0.04	8.58	21.3	0.232	0.019
58	83.	0.08	0.04	0.92E+01	0.06	0.23	0.04	8.53	21.3	0.220	0.017
59	75.	0.07	0.04	0.17E+01	0.04	0.12	0.03	8.53	21.4	0.165	0.015
61	82.	0.09	0.05	0.13E+03	0.09	0.70	0.08	8.48	20.7	0.307	0.013
62	80.	0.10	0.05	0.16E+03	0.09	0.76	0.09	8.47	20.7	0.307	0.012
63	80.	0.09	0.05	0.19E+03	0.09	0.79	0.09	8.44	20.6	0.297	0.012
64	80.	0.09	0.05	0.21E+03	0.07	0.80	0.09	8.43	20.5	0.292	0.012
65	80.	0.09	0.05	0.24E+03	0.09	0.83	0.09	8.41	20.5	0.284	0.012
66	89.	0.09	0.05	0.83E+02	0.09	0.62	0.08	8.59	21.0	0.343	0.017
67	81.	0.09	0.05	0.12E+03	0.09	0.71	0.08	8.57	20.9	0.334	0.014
68	80.	0.09	0.05	0.16E+03	0.09	0.75	0.09	8.51	20.8	0.316	0.013
69	80.	0.09	0.05	0.18E+03	0.09	0.77	0.09	8.47	20.7	0.305	0.012
70	80.	0.09	0.05	0.22E+03	0.09	0.81	0.09	8.42	20.5	0.292	0.012
71	75.	0.09	0.05	0.53E+02	0.09	0.54	0.07	8.57	21.0	0.347	0.020

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 7

72.	83.	0.10	0.05	0.79E+02	0.09	0.63	0.08	8.54	20.9	0.339	0.014
73.	80.	0.10	0.05	0.10E+03	0.09	0.68	0.08	8.49	20.8	0.322	0.013
74.	80.	0.10	0.05	0.13E+03	0.09	0.72	0.08	8.44	20.7	0.303	0.012
75.	80.	0.10	0.05	0.17E+03	0.09	0.77	0.09	8.43	20.5	0.299	0.012
76.	80.	0.09	0.05	0.20E+03	0.09	0.79	0.09	8.42	20.3	0.293	0.012
80.	96.	0.09	0.05	0.34E+02	0.11	0.45	0.06	8.57	21.1	0.350	0.053
81.	80.	0.10	0.05	0.78E+02	0.09	0.64	0.08	8.46	20.8	0.317	0.012
82.	80.	0.10	0.05	0.12E+03	0.09	0.70	0.08	8.44	20.7	0.311	0.012
83.	80.	0.10	0.05	0.14E+03	0.09	0.74	0.09	8.44	20.6	0.308	0.012
84.	75.	0.10	0.05	0.78E+02	0.09	0.63	0.07	8.51	20.9	0.331	0.027
85.	74.	0.10	0.05	0.11E+03	0.09	0.67	0.07	8.51	20.8	0.334	0.027
86.	75.	0.09	0.05	0.14E+03	0.09	0.71	0.08	8.52	20.8	0.341	0.028
87.	76.	0.09	0.05	0.18E+03	0.09	0.76	0.08	8.49	20.7	0.329	0.022
88.	75.	0.07	0.04	0.50E+02	0.08	0.50	0.06	8.93	21.9	0.562	0.115
89.	50.	0.11	0.05	0.43E+03	0.10	0.97	0.05	8.37	20.4	0.248	0.022
90.	85.	0.09	0.05	0.19E+02	0.12	0.40	0.06	8.59	21.3	0.309	0.049
91.	78.	0.10	0.05	0.18E+02	0.12	0.41	0.06	8.59	21.3	0.295	0.045
92.	75.	0.10	0.05	0.41E+02	0.10	0.51	0.06	8.59	21.2	0.321	0.038
93.	75.	0.09	0.05	0.11E+03	0.09	0.66	0.07	8.57	20.9	0.354	0.030
95.	119.	0.07	0.07	0.30E+01	0.17	0.22	0.05	8.68	21.5	0.370	0.117
96.	87.	0.09	0.05	0.67E+01	0.14	0.31	0.05	8.64	21.4	0.306	0.068
97.	102.	0.08	0.06	0.31E+01	0.16	0.24	0.05	8.66	21.5	0.332	0.097
98.	81.	0.08	0.05	0.26E+01	0.14	0.24	0.05	8.73	21.7	0.326	0.080
99.	152.	0.08	0.11	0.39E+00	0.28	0.17	0.05	8.71	21.8	0.450	0.254
100.	80.	0.06	0.04	0.69E+00	0.14	0.18	0.04	8.91	22.0	0.431	0.115
101.	139.	0.03	0.09	0.14E+00	0.23	0.13	0.05	8.90	22.0	0.498	0.316
102.	195.	0.06	0.13	0.90E-01	0.32	0.16	0.05	8.98	22.3	0.644	0.480
103.	471.	0.24	0.32	0.85E+00	0.91	0.55	0.12	8.16	22.4	0.963	0.644
104.	703.	0.37	0.46	0.45E+01	1.35	1.15	0.18	7.69	22.5	1.555	1.022
105.	695.	0.29	0.46	0.17E+01	1.21	0.88	0.17	8.56	22.8	1.487	1.257
110.	345.	0.03	0.04	0.18E+02	0.19	0.41	0.03	8.90	22.2	0.764	0.108
111.	327.	0.03	0.04	0.20E+02	0.19	0.39	0.03	8.87	21.8	0.758	0.111
112.	233.	0.02	0.04	0.72E+01	0.14	0.24	0.03	8.92	21.9	0.643	0.117
113.	234.	0.04	0.05	0.90E+01	0.17	0.29	0.04	8.82	21.6	0.619	0.119
114.	180.	0.03	0.05	0.38E+01	0.14	0.20	0.03	8.91	21.8	0.577	0.131
115.	187.	0.03	0.05	0.45E+01	0.15	0.21	0.03	8.89	21.7	0.580	0.131
116.	139.	0.05	0.07	0.26E+01	0.16	0.17	0.04	8.90	21.7	0.457	0.150
117.	130.	0.03	0.06	0.92E+00	0.13	0.12	0.03	8.92	21.9	0.490	0.156
118.	132.	0.02	0.05	0.89E+00	0.09	0.10	0.03	8.93	22.1	0.493	0.131
119.	147.	0.03	0.05	0.16E+01	0.12	0.14	0.03	8.96	22.0	0.540	0.142
121.	183.	0.02	0.04	0.34E+01	0.11	0.17	0.02	8.93	22.0	0.566	0.120
122.	125.	0.01	0.04	0.77E+00	0.06	0.08	0.02	8.85	22.2	0.349	0.095
123.	112.	0.02	0.07	0.11E+00	0.11	0.06	0.03	8.90	21.9	0.429	0.170
124.	124.	0.03	0.07	0.45E+00	0.14	0.10	0.03	8.84	21.7	0.441	0.170
125.	136.	0.05	0.08	0.97E+00	0.17	0.13	0.04	8.76	21.6	0.429	0.169
126.	120.	0.03	0.07	0.24E+00	0.13	0.08	0.03	8.84	21.7	0.435	0.178
127.	183.	0.09	0.14	0.49E+00	0.32	0.15	0.06	8.49	21.5	0.404	0.223
128.	192.	0.08	0.15	0.29E+00	0.33	0.14	0.06	8.51	21.6	0.416	0.245
129.	216.	0.09	0.17	0.17E+00	0.38	0.13	0.06	8.32	21.6	0.450	0.289
130.	129.	0.03	0.08	0.37E+00	0.14	0.08	0.03	8.84	21.7	0.466	0.196
131.	214.	0.08	0.17	0.36E+00	0.36	0.12	0.06	8.58	21.7	0.480	0.303
135.	358.	0.17	0.28	0.88E-01	0.70	0.25	0.10	8.23	21.9	0.604	0.429
136.	395.	0.21	0.30	0.29E+00	0.79	0.36	0.11	8.02	21.9	0.683	0.447
140.	162.	0.04	0.09	0.18E+01	0.20	0.16	0.03	8.85	21.8	0.614	0.237
141.	218.	0.07	0.16	0.15E+01	0.34	0.15	0.05	8.69	21.7	0.588	0.321
142.	247.	0.07	0.14	0.71E+01	0.36	0.32	0.05	8.86	21.9	0.920	0.358
143.	255.	0.09	0.10	0.11E+02	0.34	0.49	0.04	8.73	21.9	1.077	0.298
144.	505.	0.29	0.09	0.74E+02	0.79	1.85	0.04	8.25	22.2	2.539	0.376
145.	759.	0.53	0.08	0.21E+03	1.30	3.62	0.05	7.73	22.5	4.137	0.467
146.	654.	0.40	0.08	0.10E+03	1.02	2.56	0.05	8.22	22.6	3.363	0.424
147.	797.	0.61	0.07	0.32E+03	1.43	4.20	0.05	7.89	22.5	4.544	0.300
148.	418.	0.15	0.11	0.58E+02	0.61	1.32	0.05	9.37	22.6	2.406	0.501
149.	655.	0.37	0.08	0.21E+03	1.08	3.07	0.04	9.29	23.1	4.078	0.564
150.	800.	0.65	0.07	0.52E+03	1.51	4.75	0.04	8.25	22.4	4.793	0.525
151.	166.	0.01	0.08	0.66E+00	0.13	0.11	0.02	8.99	22.7	0.679	0.239
158.	809.	0.53	0.43	0.18E+03	2.02	4.36	0.25	7.98	22.7	4.334	1.735
159.	803.	0.33	0.19	0.22E+03	1.59	4.12	0.11	8.13	22.6	4.376	0.912
162.	800.	0.66	0.07	0.67E+03	1.54	5.02	0.04	8.65	22.5	5.001	0.547
163.	800.	0.66	0.07	0.79E+03	1.56	5.22	0.03	9.01	22.6	5.214	0.571

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 8

BAN FRANCISCO DELTA INLAND FROM ANTIOCH ** EXAMPLE APPLICATION
STOCKTON SHIP CHANNEL DISSOLVED OXYGEN STUDY

RESOURCE MANAGEMENT ASSOC. INC.
LAFAYETTE, CALIF.

JUN	TDS MO/L	RESULTS FOR DAY 248, HOUR 24									
		NO3 N MO/L	P04 P MO/L	T COL NO/100ML	DETROIT MO/L	C BOD MO/L	NH3 N MO/L	D O MO/L	TEMP C	ALOAE 1 MO/L	ALOAE 2 MO/L
1	921.	0.04	0.04	0.34E+03	0.54	1.70	0.03	8.67	21.1	1.388	0.096
2	784.	0.04	0.04	0.21E+03	0.45	1.32	0.03	8.64	21.4	1.243	0.094
3	746.	0.04	0.04	0.18E+03	0.43	1.22	0.03	8.65	21.4	1.211	0.094
4	629.	0.03	0.04	0.11E+03	0.36	0.94	0.03	8.67	21.6	1.093	0.099
5	535.	0.03	0.04	0.70E+02	0.31	0.75	0.03	8.70	21.7	0.988	0.102
6	460.	0.03	0.04	0.46E+02	0.27	0.61	0.03	8.72	21.7	0.903	0.104
7	395.	0.03	0.05	0.31E+02	0.24	0.51	0.03	8.74	21.8	0.824	0.105
8	311.	0.05	0.05	0.19E+02	0.20	0.41	0.04	8.70	21.7	0.682	0.094
9	253.	0.05	0.05	0.12E+02	0.18	0.34	0.04	8.69	21.6	0.597	0.097
10	210.	0.06	0.06	0.80E+01	0.17	0.30	0.04	8.68	21.6	0.532	0.100
11	179.	0.06	0.06	0.70E+01	0.16	0.27	0.04	8.67	21.6	0.485	0.103
12	161.	0.06	0.06	0.61E+01	0.16	0.25	0.05	8.67	21.6	0.456	0.110
13	153.	0.07	0.07	0.46E+01	0.18	0.23	0.05	8.66	21.7	0.433	0.126
14	154.	0.07	0.09	0.31E+01	0.21	0.20	0.05	8.62	21.7	0.418	0.145
15	163.	0.08	0.10	0.19E+01	0.25	0.19	0.05	8.57	21.7	0.413	0.168
16	164.	0.09	0.11	0.15E+01	0.26	0.19	0.05	8.55	21.8	0.408	0.175
17	180.	0.10	0.12	0.11E+01	0.30,	0.19	0.06	8.51	21.8	0.424	0.201
18	221.	0.12	0.16	0.64E+00	0.40	0.22	0.07	8.41	21.9	0.467	0.250
19	273.	0.15	0.20	0.46E+00	0.51	0.26	0.08	8.28	21.9	0.534	0.303
20	331.	0.18	0.24	0.42E+00	0.63	0.32	0.09	8.13	22.0	0.612	0.359
21	413.	0.23	0.29	0.57E+00	0.80	0.44	0.11	7.90	22.1	0.741	0.439
22	492.	0.28	0.34	0.97E+00	0.96	0.58	0.13	7.65	22.2	0.888	0.520
23	561.	0.32	0.38	0.17E+01	1.10	0.75	0.15	7.40	22.2	1.046	0.598
24	618.	0.36	0.41	0.29E+01	1.22	0.94	0.16	7.16	22.3	1.222	0.678
25	666.	0.40	0.44	0.51E+01	1.33	1.17	0.18	6.93	22.4	1.437	0.767
26	705.	0.43	0.46	0.91E+01	1.43	1.47	0.19	6.62	22.4	1.688	0.856
27	729.	0.46	0.46	0.16E+02	1.52	1.81	0.20	6.45	22.4	1.979	0.951
28	747.	0.48	0.47	0.29E+02	1.61	2.26	0.21	6.48	22.5	2.383	1.095
29	699.	0.48	0.46	0.18E+02	1.42	1.71	0.18	6.25	22.2	1.797	0.825
30	607.	0.46	0.46	0.38E+01	1.08	0.76	0.13	6.49	21.8	0.854	0.430
31	529.	0.42	0.44	0.69E+00	0.80	0.34	0.10	7.52	21.7	0.457	0.274
33	802.	0.54	0.18	0.20E+03	1.56	4.02	0.11	7.99	22.9	4.538	0.883
34	801.	0.57	0.10	0.27E+03	1.46	4.12	0.07	8.14	22.9	4.695	0.634
35	800.	0.60	0.08	0.34E+03	1.46	4.37	0.05	8.19	22.8	4.777	0.557
36	800.	0.63	0.07	0.47E+03	1.49	4.63	0.04	8.16	22.7	4.789	0.536
37	712.	0.42	0.45	0.12E+02	1.43	1.64	0.19	7.13	22.3	1.920	0.964
38	746.	0.44	0.45	0.23E+02	1.54	2.15	0.21	7.31	22.7	2.434	1.157
39	772.	0.46	0.45	0.39E+02	1.65	2.73	0.22	7.39	22.9	2.948	1.339
40	789.	0.49	0.46	0.62E+02	1.78	3.30	0.24	7.40	22.9	3.384	1.492
41	161.	0.08	0.10	0.19E+01	0.24	0.18	0.05	8.58	21.7	0.409	0.167
42	202.	0.11	0.14	0.76E+00	0.35	0.20	0.06	8.45	21.8	0.440	0.225
43	190.	0.10	0.13	0.63E+00	0.33	0.19	0.06	8.32	21.9	0.446	0.235
44	759.	0.49	0.47	0.41E+02	1.68	2.61	0.22	6.66	22.6	2.699	1.219
45	776.	0.50	0.46	0.62E+02	1.77	3.11	0.23	6.97	22.7	3.157	1.379
46	788.	0.50	0.43	0.83E+02	1.84	3.32	0.24	7.21	22.8	3.539	1.484
48	682.	0.37	0.46	0.18E+01	1.25	0.87	0.17	7.65	22.6	1.216	0.763
49	730.	0.42	0.47	0.58E+01	1.35	1.32	0.19	7.47	22.7	1.619	0.919
50	389.	0.02	0.04	0.20E+02	0.21	0.45	0.03	8.91	22.0	0.965	0.107
51	611.	0.04	0.04	0.11E+03	0.35	0.94	0.03	8.63	21.5	1.038	0.088
52	447.	0.05	0.04	0.52E+02	0.26	0.65	0.04	8.61	21.6	0.816	0.079
53	314.	0.06	0.05	0.24E+02	0.19	0.46	0.04	8.62	21.6	0.639	0.071
54	202.	0.07	0.05	0.14E+02	0.13	0.37	0.05	8.60	21.5	0.474	0.052
55	137.	0.08	0.05	0.19E+02	0.10	0.37	0.05	8.58	21.4	0.379	0.034
56	102.	0.09	0.05	0.20E+02	0.08	0.34	0.05	8.55	21.4	0.302	0.023
57	82.	0.08	0.04	0.52E+01	0.05	0.20	0.04	8.58	21.5	0.235	0.019
58	85.	0.08	0.04	0.79E+01	0.06	0.22	0.04	8.53	21.4	0.226	0.017
59	76.	0.08	0.04	0.16E+01	0.04	0.12	0.03	8.54	21.6	0.168	0.015
61	82.	0.09	0.05	0.11E+03	0.09	0.68	0.08	8.50	21.0	0.328	0.014
62	80.	0.10	0.05	0.14E+03	0.09	0.74	0.09	8.48	20.8	0.315	0.013
63	80.	0.09	0.05	0.18E+03	0.09	0.77	0.09	8.44	20.7	0.297	0.012
64	80.	0.09	0.05	0.20E+03	0.09	0.79	0.09	8.42	20.6	0.286	0.012
65	80.	0.09	0.05	0.24E+03	0.09	0.82	0.09	8.39	20.5	0.274	0.012
66	90.	0.09	0.05	0.74E+02	0.09	0.61	0.08	8.61	21.3	0.370	0.018
67	81.	0.09	0.05	0.11E+03	0.09	0.69	0.08	8.57	21.1	0.346	0.014
68	80.	0.10	0.05	0.14E+03	0.09	0.73	0.09	8.50	20.8	0.319	0.013
69	80.	0.10	0.05	0.16E+03	0.09	0.76	0.09	8.47	20.7	0.304	0.012
70	80.	0.09	0.05	0.21E+03	0.09	0.80	0.09	8.41	20.6	0.284	0.012
71	102.	0.09	0.05	0.41E+02	0.09	0.50	0.07	8.58	21.3	0.367	0.022

FIGURE VI-6 (Cont.)

LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 9

72	86.	0.10	0.05	0.63E+02	0.09	0.59	0.08	8.54	21.1	0.351	0.016
73	81.	0.10	0.05	0.85E+02	0.09	0.65	0.08	8.50	21.0	0.331	0.013
74	80.	0.10	0.05	0.11E+03	0.09	0.70	0.08	8.46	20.8	0.316	0.013
75	80.	0.10	0.05	0.14E+03	0.09	0.75	0.09	8.42	20.7	0.302	0.012
76	80.	0.09	0.05	0.19E+03	0.09	0.78	0.09	8.41	20.6	0.293	0.012
80	103.	0.09	0.05	0.30E+02	0.11	0.44	0.06	8.37	21.3	0.366	0.053
81	80.	0.10	0.05	0.74E+02	0.09	0.64	0.08	8.45	20.9	0.321	0.012
82	80.	0.10	0.05	0.11E+03	0.09	0.69	0.08	8.44	20.8	0.314	0.012
83	80.	0.10	0.05	0.13E+03	0.09	0.72	0.09	8.43	20.8	0.309	0.012
84	75.	0.10	0.05	0.71E+02	0.09	0.61	0.07	8.31	21.1	0.340	0.026
85	75.	0.10	0.05	0.10E+03	0.09	0.66	0.07	8.31	21.0	0.345	0.025
86	75.	0.10	0.05	0.13E+03	0.09	0.71	0.08	8.30	20.9	0.338	0.023
87	75.	0.10	0.05	0.17E+03	0.09	0.76	0.08	8.45	20.7	0.308	0.017
88	75.	0.07	0.04	0.60E+02	0.08	0.53	0.06	8.81	22.0	0.548	0.095
89	50.	0.11	0.05	0.43E+03	0.10	0.97	0.05	8.34	20.0	0.219	0.020
90	88.	0.09	0.05	0.18E+02	0.11	0.40	0.06	8.38	21.4	0.325	0.048
91	79.	0.10	0.05	0.16E+02	0.11	0.40	0.06	8.39	21.5	0.307	0.044
92	75.	0.10	0.05	0.36E+02	0.10	0.49	0.06	8.39	21.4	0.330	0.036
93	75.	0.10	0.05	0.10E+03	0.09	0.66	0.07	8.54	21.1	0.353	0.027
95	129.	0.07	0.07	0.32E+01	0.16	0.22	0.05	8.67	21.7	0.393	0.113
96	90.	0.09	0.05	0.68E+01	0.13	0.30	0.05	8.63	21.7	0.318	0.068
97	111.	0.08	0.06	0.29E+01	0.16	0.23	0.05	8.66	21.7	0.353	0.100
98	83.	0.08	0.05	0.28E+01	0.14	0.24	0.05	8.71	21.9	0.329	0.077
99	156.	0.08	0.11	0.46E+00	0.27	0.17	0.05	8.67	22.1	0.445	0.239
100	81.	0.06	0.04	0.84E+00	0.13	0.17	0.04	8.85	22.3	0.419	0.112
101	143.	0.06	0.10	0.16E+00	0.23	0.13	0.05	8.83	22.3	0.490	0.300
102	195.	0.06	0.13	0.97E-01	0.31	0.15	0.05	8.89	22.6	0.627	0.452
103	476.	0.24	0.33	0.73E+00	0.89	0.53	0.12	8.08	22.5	0.934	0.605
104	697.	0.37	0.45	0.40E+01	1.30	1.12	0.18	7.53	22.7	1.518	0.944
105	697.	0.31	0.45	0.19E+01	1.18	0.89	0.17	8.27	23.0	1.473	1.159
110	375.	0.02	0.04	0.19E+02	0.20	0.43	0.03	8.80	22.4	0.810	0.105
111	371.	0.02	0.04	0.24E+02	0.21	0.44	0.03	8.82	22.1	0.819	0.107
112	267.	0.02	0.04	0.88E+01	0.15	0.27	0.03	8.89	22.2	0.703	0.112
113	288.	0.04	0.05	0.14E+02	0.19	0.35	0.03	8.79	21.8	0.698	0.113
114	211.	0.03	0.05	0.53E+01	0.15	0.23	0.03	8.87	22.0	0.622	0.125
115	224.	0.03	0.05	0.66E+01	0.16	0.25	0.03	8.84	22.0	0.632	0.124
116	151.	0.05	0.07	0.31E+01	0.16	0.19	0.04	8.76	21.9	0.473	0.137
117	140.	0.03	0.06	0.12E+01	0.13	0.13	0.03	8.88	22.1	0.510	0.148
118	144.	0.02	0.05	0.10E+01	0.10	0.11	0.03	8.92	22.4	0.532	0.127
119	162.	0.03	0.05	0.20E+01	0.13	0.16	0.03	8.91	22.2	0.572	0.136
121	210.	0.02	0.04	0.41E+01	0.12	0.19	0.03	8.91	22.3	0.625	0.116
122	136.	0.01	0.04	0.82E+00	0.07	0.08	0.02	8.83	22.5	0.389	0.094
123	117.	0.02	0.07	0.13E+00	0.12	0.07	0.03	8.86	22.1	0.439	0.167
124	133.	0.04	0.07	0.66E+00	0.15	0.11	0.03	8.81	22.0	0.458	0.162
125	145.	0.05	0.08	0.14E+01	0.17	0.14	0.04	8.75	21.9	0.446	0.160
126	126.	0.03	0.07	0.32E+00	0.14	0.09	0.03	8.82	21.9	0.445	0.170
127	179.	0.09	0.13	0.83E+00	0.29	0.16	0.05	8.51	21.7	0.407	0.201
128	188.	0.09	0.14	0.45E+00	0.31	0.14	0.05	8.32	21.8	0.414	0.223
129	220.	0.09	0.17	0.21E+00	0.37	0.14	0.06	8.50	21.9	0.451	0.274
130	130.	0.03	0.08	0.27E+00	0.14	0.08	0.03	8.82	21.9	0.461	0.186
131	217.	0.08	0.17	0.23E+00	0.36	0.12	0.06	8.55	21.9	0.468	0.287
135	361.	0.18	0.28	0.13E+00	0.68	0.26	0.09	8.22	22.1	0.614	0.413
136	367.	0.20	0.27	0.32E+00	0.70	0.34	0.10	8.07	22.1	0.651	0.398
140	155.	0.03	0.09	0.89E+00	0.18	0.12	0.03	8.82	22.0	0.560	0.222
141	218.	0.07	0.17	0.72E+00	0.34	0.13	0.05	8.63	21.9	0.537	0.304
142	237.	0.07	0.15	0.38E+01	0.35	0.24	0.05	8.76	22.1	0.780	0.337
143	236.	0.07	0.11	0.65E+01	0.31	0.38	0.04	8.74	22.1	0.968	0.286
144	418.	0.22	0.09	0.44E+02	0.63	1.33	0.04	8.36	22.4	2.007	0.343
145	709.	0.49	0.08	0.16E+03	1.19	3.18	0.05	7.72	22.7	3.759	0.442
146	628.	0.38	0.08	0.89E+02	0.97	2.38	0.05	8.07	22.7	3.160	0.408
147	794.	0.60	0.07	0.29E+03	1.41	4.09	0.05	7.79	22.8	4.479	0.494
148	369.	0.12	0.12	0.37E+02	0.54	0.99	0.05	9.01	22.6	1.943	0.450
149	613.	0.34	0.09	0.17E+03	0.99	2.72	0.05	8.76	22.9	3.605	0.526
150	800.	0.64	0.07	0.49E+03	1.50	4.69	0.04	8.04	22.7	4.773	0.524
151	172.	0.01	0.08	0.69E+00	0.14	0.11	0.02	9.00	23.2	0.712	0.231
158	804.	0.51	0.54	0.11E+03	2.13	4.31	0.30	7.50	22.9	3.917	1.969
159	804.	0.53	0.35	0.15E+03	1.83	4.16	0.20	7.77	23.0	4.283	1.406
162	800.	0.68	0.07	0.63E+03	1.53	4.93	0.04	7.96	22.4	4.705	0.519
163	800.	0.72	0.08	0.78E+03	1.56	5.21	0.03	7.79	22.0	4.516	0.503

FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 10

JUN	TDS MG/L	TOT N MG/L	AVERAGE QUALITY ON DAY 249								TEMP C	DISCH 1 UNITS	DISCH 2 UNITS	DISCH 3 UNITS	DISCH 4 UNITS
			TOT P MG/L	T COL NO/100ML	F COL NO/100ML	C BOD MG/L	N BOD. MG/L	D O MG/L	DISCH 1 UNITS	DISCH 2 UNITS					
1	38.6	0.0017	0.0017	0.143E+02	0.0227	0.0711	0.0013	0.361	0.88	0.0381	0.0040				
2	33.1	0.0016	0.0017	0.870E+01	0.0191	0.0553	0.0013	0.360	0.89	0.0325	0.0038				
3	31.7	0.0015	0.0017	0.752E+01	0.0181	0.0511	0.0013	0.360	0.90	0.0314	0.0039				
4	27.0	0.0013	0.0018	0.457E+01	0.0153	0.0395	0.0013	0.361	0.91	0.0470	0.0040				
5	23.3	0.0013	0.0018	0.288E+01	0.0131	0.0314	0.0013	0.362	0.91	0.0429	0.0041				
6	20.2	0.0013	0.0019	0.192E+01	0.0115	0.0258	0.0013	0.362	0.92	0.0395	0.0041				
7	17.5	0.0014	0.0019	0.129E+01	0.0102	0.0214	0.0014	0.363	0.92	0.0363	0.0042				
8	13.9	0.0018	0.0020	0.790E+00	0.0085	0.0174	0.0015	0.361	0.91	0.0304	0.0037				
9	11.5	0.0021	0.0022	0.481E+00	0.0076	0.0143	0.0016	0.361	0.91	0.0267	0.0038				
10	9.6	0.0023	0.0023	0.333E+00	0.0070	0.0124	0.0017	0.361	0.91	0.0237	0.0039				
11	8.2	0.0025	0.0025	0.292E+00	0.0066	0.0113	0.0018	0.361	0.91	0.0218	0.0040				
12	7.4	0.0027	0.0027	0.253E+00	0.0066	0.0106	0.0018	0.361	0.91	0.0205	0.0043				
13	6.9	0.0029	0.0030	0.191E+00	0.0072	0.0095	0.0019	0.360	0.92	0.0193	0.0049				
14	6.9	0.0031	0.0035	0.129E+00	0.0082	0.0084	0.0020	0.359	0.92	0.0185	0.0056				
15	7.1	0.0034	0.0042	0.809E-01	0.0096	0.0077	0.0021	0.357	0.92	0.0181	0.0065				
16	7.1	0.0037	0.0044	0.666E-01	0.0101	0.0078	0.0021	0.356	0.92	0.0178	0.0068				
17	7.7	0.0041	0.0050	0.484E-01	0.0116	0.0078	0.0023	0.355	0.92	0.0183	0.0077				
18	9.3	0.0050	0.0063	0.291E-01	0.0151	0.0087	0.0026	0.351	0.93	0.0200	0.0097				
19	11.3	0.0062	0.0078	0.215E-01	0.0193	0.0105	0.0031	0.346	0.93	0.0226	0.0117				
20	13.6	0.0075	0.0094	0.201E-01	0.0238	0.0131	0.0036	0.340	0.93	0.0260	0.0140				
21	17.0	0.0095	0.0117	0.269E-01	0.0304	0.0179	0.0043	0.330	0.93	0.0316	0.0173				
22	20.2	0.0116	0.0137	0.438E-01	0.0367	0.0239	0.0051	0.320	0.94	0.0380	0.0207				
23	23.0	0.0134	0.0155	0.739E-01	0.0424	0.0309	0.0058	0.310	0.94	0.0451	0.0240				
24	25.4	0.0151	0.0169	0.124E+00	0.0474	0.0390	0.0065	0.299	0.94	0.0529	0.0275				
25	27.3	0.0166	0.0180	0.213E+00	0.0521	0.0489	0.0071	0.289	0.95	0.0622	0.0314				
26	29.2	0.0181	0.0188	0.372E+00	0.0567	0.0616	0.0078	0.276	0.95	0.0730	0.0353				
27	30.3	0.0192	0.0193	0.646E+00	0.0610	0.0759	0.0083	0.268	0.95	0.0851	0.0395				
28	31.1	0.0200	0.0195	0.116E+01	0.0656	0.0943	0.0088	0.270	0.95	0.1016	0.0456				
29	29.3	0.0202	0.0194	0.740E+00	0.0581	0.0720	0.0077	0.261	0.94	0.0776	0.0347				
30	25.9	0.0193	0.0192	0.161E+00	0.0443	0.0331	0.0056	0.273	0.92	0.0385	0.0184				
31	22.8	0.0178	0.0187	0.308E-01	0.0334	0.0153	0.0043	0.318	0.92	0.0212	0.0117				
33	33.4	0.0227	0.0077	0.807E+01	0.0651	0.1467	0.0046	0.332	0.96	0.1889	0.0368				
34	33.4	0.0237	0.0044	0.111E+02	0.0608	0.1714	0.0027	0.338	0.96	0.1954	0.0264				
35	33.4	0.0250	0.0033	0.151E+02	0.0608	0.1820	0.0020	0.340	0.95	0.1988	0.0232				
36	33.3	0.0263	0.0031	0.194E+02	0.0619	0.1930	0.0017	0.338	0.95	0.1993	0.0223				
37	29.5	0.0176	0.0186	0.500E+00	0.0573	0.0684	0.0079	0.297	0.95	0.0825	0.0398				
38	30.9	0.0184	0.0168	0.918E+00	0.0622	0.0898	0.0086	0.305	0.96	0.1037	0.0480				
39	32.1	0.0193	0.0189	0.156E+01	0.0677	0.1136	0.0093	0.308	0.97	0.1247	0.0557				
40	32.8	0.0203	0.0191	0.253E+01	0.0736	0.1370	0.0100	0.308	0.97	0.1422	0.0621				
41	7.1	0.0034	0.0041	0.795E-01	0.0094	0.0075	0.0020	0.357	0.92	0.0179	0.0065				
42	8.5	0.0043	0.0057	0.339E-01	0.0135	0.0080	0.0024	0.353	0.92	0.0188	0.0087				
43	8.0	0.0043	0.0054	0.283E-01	0.0128	0.0076	0.0024	0.355	0.93	0.0190	0.0090				
44	31.6	0.0203	0.0196	0.168E+01	0.0690	0.1089	0.0093	0.277	0.96	0.1144	0.0508				
45	32.3	0.0207	0.0193	0.252E+01	0.0731	0.1295	0.0097	0.290	0.96	0.1329	0.0375				
46	32.8	0.0211	0.0189	0.338E+01	0.0763	0.1463	0.0100	0.300	0.96	0.1483	0.0618				
48	28.0	0.0156	0.0185	0.771E-01	0.0480	0.0357	0.0068	0.320	0.96	0.0523	0.0307				
49	30.2	0.0175	0.0193	0.241E+00	0.0533	0.0552	0.0077	0.312	0.96	0.0704	0.0380				
50	17.9	0.0008	0.0016	0.830E+00	0.0092	0.0192	0.0012	0.369	0.93	0.0435	0.0040				
51	26.2	0.0016	0.0018	0.454E+01	0.0148	0.0394	0.0014	0.359	0.90	0.0445	0.0036				
52	19.3	0.0019	0.0018	0.217E+01	0.0111	0.0274	0.0015	0.358	0.91	0.0356	0.0032				
53	13.9	0.0023	0.0019	0.996E+00	0.0082	0.0194	0.0017	0.358	0.91	0.0283	0.0029				
54	9.1	0.0028	0.0019	0.595E+00	0.0057	0.0155	0.0019	0.358	0.91	0.0213	0.0021				
55	6.1	0.0033	0.0019	0.768E+00	0.0043	0.0155	0.0022	0.357	0.90	0.0169	0.0014				
56	4.5	0.0036	0.0019	0.819E+00	0.0033	0.0140	0.0022	0.356	0.90	0.0134	0.0010				
57	3.6	0.0035	0.0018	0.216E+00	0.0023	0.0081	0.0017	0.358	0.91	0.0103	0.0008				
58	3.7	0.0035	0.0019	0.327E+00	0.0024	0.0092	0.0017	0.356	0.90	0.0101	0.0007				
59	3.3	0.0033	0.0018	0.670E-01	0.0017	0.0049	0.0012	0.357	0.91	0.0073	0.0004				
61	3.4	0.0039	0.0020	0.461E+01	0.0037	0.0282	0.0034	0.355	0.88	0.0138	0.0006				
62	3.3	0.0040	0.0020	0.597E+01	0.0038	0.0307	0.0036	0.354	0.87	0.0132	0.0005				
63	3.3	0.0040	0.0020	0.735E+01	0.0038	0.0321	0.0037	0.352	0.86	0.0124	0.0005				
64	3.3	0.0039	0.0020	0.843E+01	0.0039	0.0331	0.0037	0.351	0.86	0.0120	0.0005				
65	3.3	0.0039	0.0020	0.100E+02	0.0039	0.0343	0.0038	0.350	0.86	0.0115	0.0005				
66	3.8	0.0038	0.0020	0.305E+01	0.0037	0.0251	0.0032	0.359	0.90	0.0158	0.0008				
67	3.4	0.0039	0.0020	0.451E+01	0.0037	0.0287	0.0034	0.358	0.88	0.0146	0.0006				
68	3.3	0.0040	0.0020	0.584E+01	0.0038	0.0305	0.0036	0.355	0.87	0.0134	0.0005				
69	3.3	0.0040	0.0020	0.673E+01	0.0038	0.0315	0.0036	0.354	0.87	0.0128	0.0005				
70	3.3	0.0039	0.0020	0.872E+01	0.0039	0.0333	0.0037	0.351	0.86	0.0119	0.0005				
71	4.4	0.0037	0.0020	0.170E+01	0.0038	0.0209	0.0028	0.357	0.90	0.0160	0.0009				

FIGURE VI-6 (Cont.)

LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 11

72	3.7	0.0040	0.0020	0.259E+01	0.0036	0.0246	0.0032	0.356	0.87	0.0150	0.0007
73	3.4	0.0040	0.0020	0.352E+01	0.0037	0.0271	0.0034	0.354	0.88	0.0140	0.0006
74	3.3	0.0040	0.0020	0.460E+01	0.0037	0.0289	0.0035	0.353	0.87	0.0133	0.0005
75	3.3	0.0040	0.0020	0.659E+01	0.0038	0.0313	0.0036	0.352	0.87	0.0127	0.0005
76	3.3	0.0040	0.0020	0.778E+01	0.0039	0.0325	0.0037	0.351	0.86	0.0123	0.0005
80	4.5	0.0036	0.0022	0.122E+01	0.0045	0.0181	0.0025	0.357	0.90	0.0161	0.0021
81	3.3	0.0041	0.0020	0.308E+01	0.0036	0.0264	0.0033	0.352	0.88	0.0136	0.0005
82	3.3	0.0040	0.0020	0.452E+01	0.0037	0.0289	0.0035	0.352	0.87	0.0132	0.0005
83	3.3	0.0040	0.0020	0.549E+01	0.0038	0.0301	0.0035	0.352	0.87	0.0130	0.0005
84	3.1	0.0041	0.0020	0.291E+01	0.0036	0.0255	0.0029	0.355	0.89	0.0145	0.0010
85	3.1	0.0040	0.0020	0.412E+01	0.0036	0.0276	0.0031	0.355	0.88	0.0143	0.0009
86	3.1	0.0040	0.0020	0.548E+01	0.0037	0.0294	0.0032	0.355	0.87	0.0130	0.0007
87	3.1	0.0040	0.0020	0.720E+01	0.0038	0.0316	0.0033	0.353	0.93	0.0239	0.0032
88	3.1	0.0031	0.0017	0.249E+01	0.0033	0.0220	0.0027	0.365	0.93	0.0091	0.0008
89	2.1	0.0046	0.0021	0.178E+02	0.0041	0.0403	0.0021	0.347	0.83	0.0147	0.0010
90	3.8	0.0039	0.0021	0.739E+00	0.0042	0.0162	0.0024	0.357	0.91	0.0139	0.0016
91	3.3	0.0040	0.0020	0.661E+00	0.0040	0.0162	0.0024	0.357	0.90	0.0146	0.0013
92	3.2	0.0040	0.0020	0.148E+01	0.0037	0.0201	0.0026	0.357	0.89	0.0150	0.0010
93	3.1	0.0040	0.0020	0.413E+01	0.0036	0.0272	0.0030	0.356	0.92	0.0176	0.0044
95	5.8	0.0030	0.0028	0.135E+00	0.0065	0.0089	0.0019	0.361	0.91	0.0143	0.0026
96	3.9	0.0037	0.0022	0.284E+00	0.0048	0.0120	0.0022	0.359	0.92	0.0158	0.0039
97	4.9	0.0033	0.0026	0.123E+00	0.0060	0.0092	0.0020	0.360	0.93	0.0145	0.0031
98	3.6	0.0034	0.0021	0.121E+00	0.0050	0.0094	0.0020	0.362	0.93	0.0188	0.0093
99	6.6	0.0035	0.0044	0.213E-01	0.0105	0.0066	0.0021	0.360	0.94	0.0176	0.0046
100	3.5	0.0027	0.0019	0.380E-01	0.0051	0.0069	0.0018	0.366	0.94	0.0205	0.0117
101	6.2	0.0026	0.0041	0.795E-02	0.0093	0.0051	0.0019	0.366	0.96	0.0263	0.0177
102	B.4	0.0028	0.0055	0.487E-02	0.0124	0.0063	0.0022	0.367	0.95	0.0399	0.0239
103	19.6	0.0103	0.0132	0.337E-01	0.0339	0.0218	0.0048	0.337	0.95	0.0660	0.0379
104	28.9	0.0159	0.0187	0.169E+00	0.0512	0.0468	0.0072	0.314	0.96	0.0313	0.0453
105	29.1	0.0135	0.0187	0.812E-01	0.0463	0.0373	0.0069	0.342	0.97	0.0362	0.0441
110	17.0	0.0009	0.0018	0.777E+00	0.0088	0.0184	0.0012	0.365	0.93	0.0366	0.0042
111	16.7	0.0010	0.0018	0.977E+00	0.0091	0.0187	0.0012	0.365	0.94	0.0323	0.0044
112	12.4	0.0008	0.0019	0.361E+00	0.0068	0.0118	0.0011	0.369	0.92	0.0313	0.0044
113	13.1	0.0014	0.0021	0.570E+00	0.0081	0.0147	0.0014	0.365	0.93	0.0283	0.0049
114	9.8	0.0013	0.0022	0.219E+00	0.0065	0.0097	0.0013	0.368	0.93	0.0286	0.0049
115	10.3	0.0014	0.0022	0.274E+00	0.0069	0.0107	0.0014	0.367	0.93	0.0212	0.0053
116	6.9	0.0022	0.0028	0.130E+00	0.0065	0.0080	0.0017	0.364	0.94	0.0231	0.0058
117	6.5	0.0014	0.0027	0.509E-01	0.0056	0.0057	0.0014	0.368	0.95	0.0252	0.0050
118	6.9	0.0007	0.0021	0.436E-01	0.0045	0.0051	0.0011	0.370	0.94	0.0261	0.0054
119	7.6	0.0012	0.0023	0.825E-01	0.0055	0.0068	0.0013	0.369	0.95	0.0293	0.0045
121	9.9	0.0006	0.0019	0.170E+00	0.0056	0.0084	0.0011	0.369	0.95	0.0193	0.0038
122	6.6	0.0004	0.0018	0.343E-01	0.0033	0.0040	0.0008	0.367	0.94	0.0194	0.0068
123	5.3	0.0010	0.0031	0.624E-02	0.0051	0.0029	0.0012	0.367	0.93	0.0204	0.0064
124	6.1	0.0016	0.0031	0.289E-01	0.0061	0.0047	0.0014	0.366	0.93	0.0199	0.0063
125	6.6	0.0022	0.0034	0.579E-01	0.0071	0.0061	0.0016	0.364	0.93	0.0197	0.0068
126	5.7	0.0014	0.0031	0.144E-01	0.0058	0.0038	0.0013	0.366	0.93	0.0176	0.0077
127	7.7	0.0037	0.0031	0.362E-01	0.0114	0.0066	0.0022	0.355	0.92	0.0178	0.0086
128	8.0	0.0037	0.0057	0.201E-01	0.0122	0.0058	0.0022	0.355	0.93	0.0192	0.0106
129	9.3	0.0041	0.0067	0.944E-02	0.0146	0.0057	0.0024	0.355	0.93	0.0203	0.0075
130	5.8	0.0013	0.0034	0.121E-01	0.0062	0.0037	0.0013	0.366	0.93	0.0200	0.0111
131	9.2	0.0037	0.0070	0.101E-01	0.0143	0.0051	0.0023	0.357	0.94	0.0257	0.0159
133	14.7	0.0075	0.0110	0.665E-02	0.0257	0.0105	0.0037	0.344	0.94	0.0275	0.0155
136	15.0	0.0082	0.0106	0.159E-01	0.0266	0.0137	0.0038	0.338	0.93	0.0245	0.0087
140	6.8	0.0016	0.0040	0.370E-01	0.0080	0.0054	0.0014	0.366	0.93	0.0230	0.0119
141	9.3	0.0034	0.0068	0.298E-01	0.0140	0.0058	0.0022	0.359	0.94	0.0334	0.0133
142	10.1	0.0033	0.0064	0.156E+00	0.0146	0.0103	0.0020	0.364	0.94	0.0418	0.0116
143	10.2	0.0033	0.0045	0.264E+00	0.0133	0.0163	0.0016	0.362	0.94	0.0849	0.0140
144	17.6	0.0092	0.0040	0.179E+01	0.0263	0.0554	0.0018	0.347	0.95	0.1568	0.0183
145	29.6	0.0205	0.0033	0.661E+01	0.0496	0.1323	0.0020	0.322	0.96	0.1328	0.0169
146	26.3	0.0158	0.0034	0.362E+01	0.0406	0.0992	0.0021	0.335	0.95	0.1864	0.0208
147	33.1	0.0249	0.0031	0.120E+02	0.0587	0.1700	0.0019	0.325	0.95	0.0820	0.0181
148	15.6	0.0055	0.0051	0.150E+01	0.0224	0.0414	0.0020	0.371	0.96	0.1506	0.0216
149	25.7	0.0144	0.0036	0.712E+01	0.0413	0.1130	0.0019	0.360	0.97	0.1987	0.0218
150	33.3	0.0268	0.0030	0.205E+02	0.0625	0.1933	0.0017	0.334	0.94	0.0323	0.0091
151	7.6	0.0006	0.0036	0.288E-01	0.0062	0.0052	0.0009	0.373	0.99	0.1635	0.0820
158	33.5	0.0214	0.0227	0.468E+01	0.0887	0.1789	0.0127	0.312	0.97	0.1785	0.0583
159	33.5	0.0220	0.0147	0.614E+01	0.0763	0.1727	0.0083	0.323	0.97	0.1959	0.0216
162	33.3	0.0282	0.0031	0.261E+02	0.0638	0.2065	0.0015	0.330	0.93	0.1881	0.0210
163	33.3	0.0298	0.0032	0.327E+02	0.0649	0.2170	0.0014	0.323	0.92	0.1881	0.0210

FIGURE VI-6 (Cont.)

CONCENTRATION PROFILE OXYGEN PLOT NO. 1

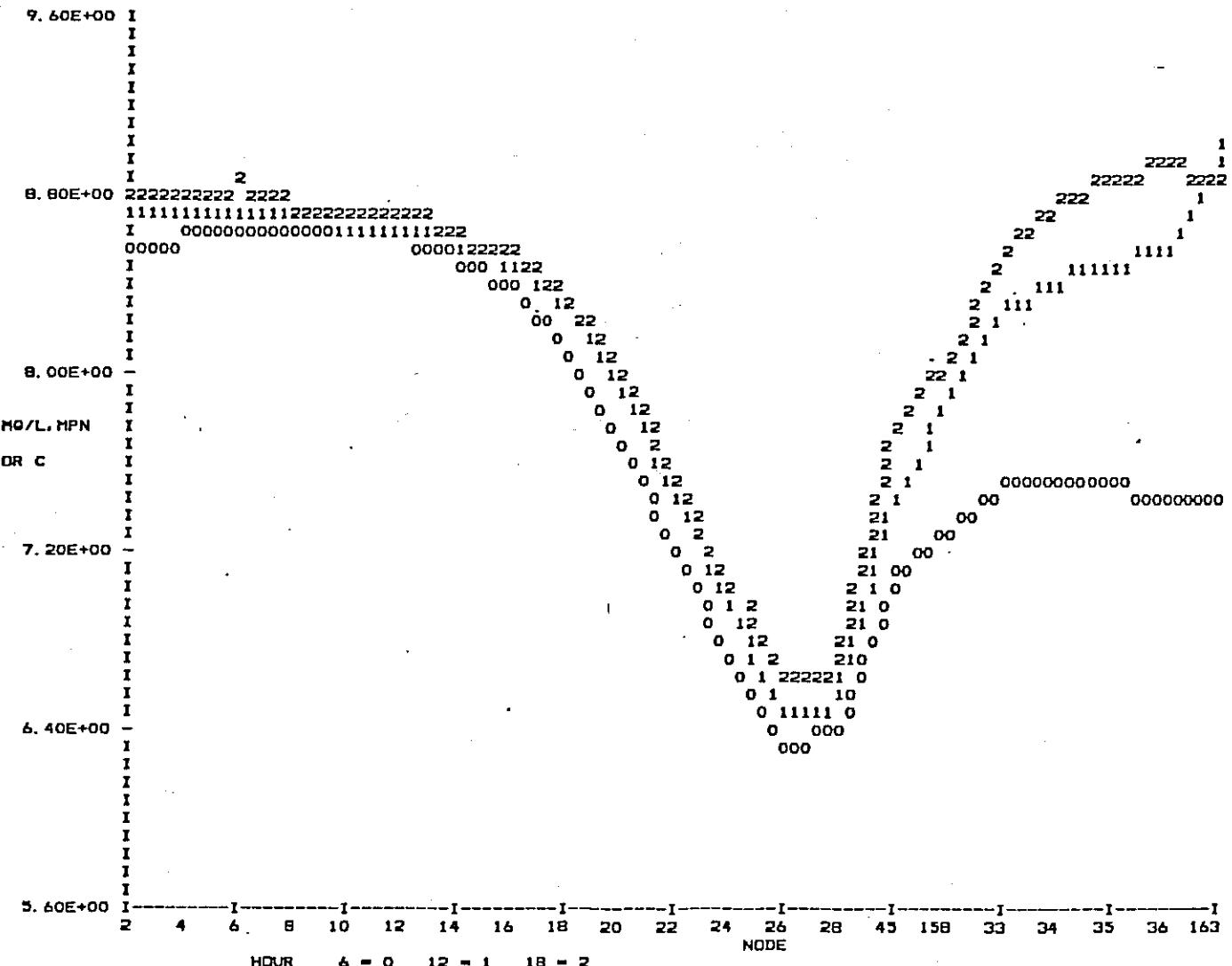


FIGURE VI-6 (Cont.)

TIME HISTORY OXYGEN PLOT NO. 1

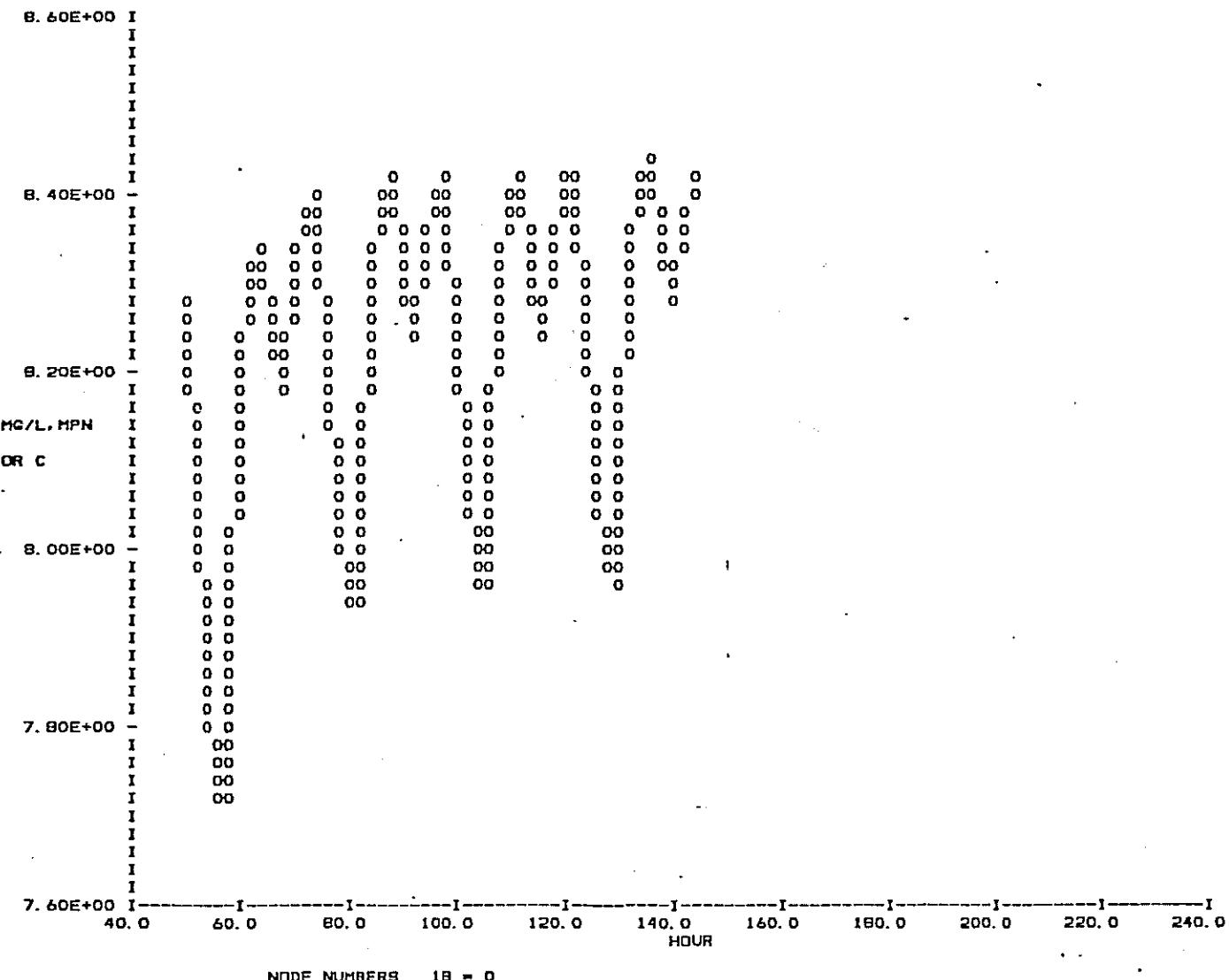


FIGURE VI-6 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE APPLICATION PRINTOUT PAGE 14

31 CARDS SKIPPED TO REACH THE "ER" CARD

*** ERROR: SPECIFIED CHANNELS FOR PROFILE PLOT ARE NOT CONSECUTIVE ***
PROGRAM IN SUBROUTINE PLMXMN... ATTEMPT TO PLOT

7 CARDS SKIPPED TO REACH THE "ER" CARD

FIGURE VI-7
LINK-NODE WATER QUALITY MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 1

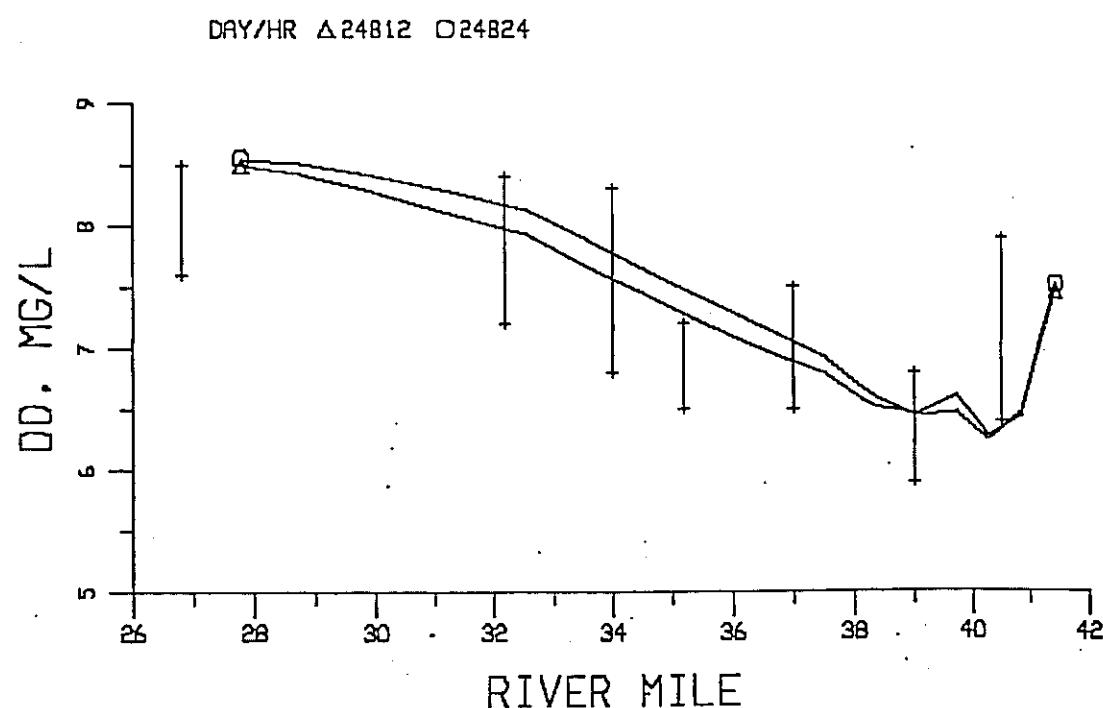
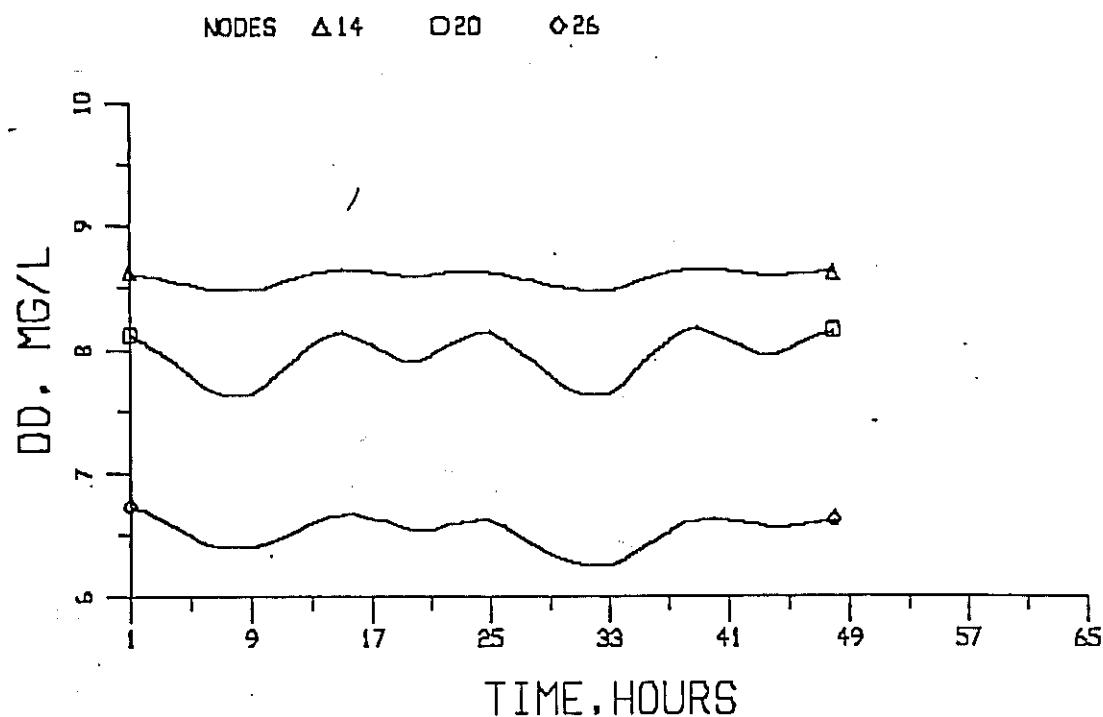
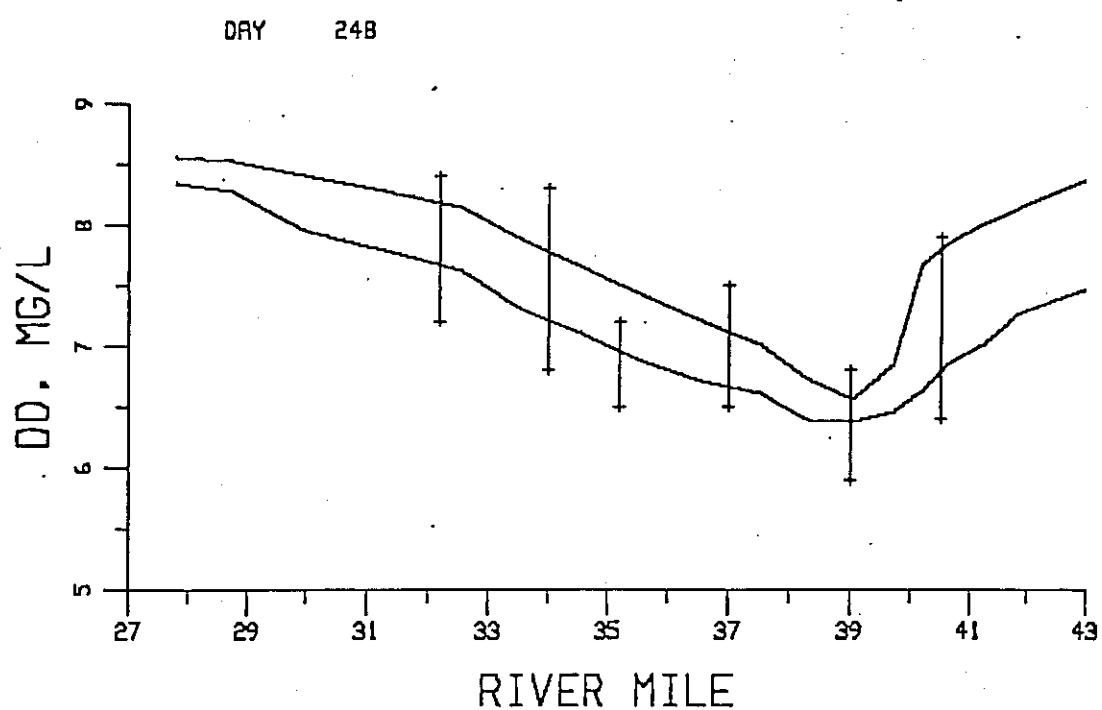


FIGURE VI-7 (Cont.)
LINK-NODE WATER QUALITY MODEL EXAMPLE HIGH RESOLUTION PLOTS PAGE 2



REFERENCES

1. Hydrologic-Water Quality Model Development and Testing, San Francisco Bay-Delta Water Quality Control Program Task Orders III-1, III-2, III-3. Department of Water Resources, State of California and Water Resources Engineers Inc., January 1968.
2. Lerseth, Richard, "Delta Hydrodynamic Operations Model", Department of Water Resources of California, June 1976.
3. Zison, S. W., et al., "Rates, Constants and Kinetics Formulations in Surface Water Quality Modeling", Tetra Tech, Inc., Technical Report prepared for the Environmental Protection Agency, Athens, Georgia, December 1978.
4. Collins, C. D. and J. H. Wlosinski, Coefficients for use in the U.S. Army Corps of Engineers Reservoir Model, CE-QUAL-R1, Environmental Laboratory, U.S. Army Engineers, Waterways Experiment Station, Vicksburg, Mississippi, October 1983.
5. Smith, D. J., "Water Quality for River-Reservoir Systems", Resource Management Associates, computer program description prepared for the U.S. Army Corps of Engineers, the Hydrologic Engineering Center, Davis, California, October 1978.

